WIRELESS VOICE AND DATA FOR MOBILE, REMOTE, AND MISSION-CRITICAL OPERATIONS

RadioResource™ MAGAZINE

www.radioresourcemag.com | August 2002

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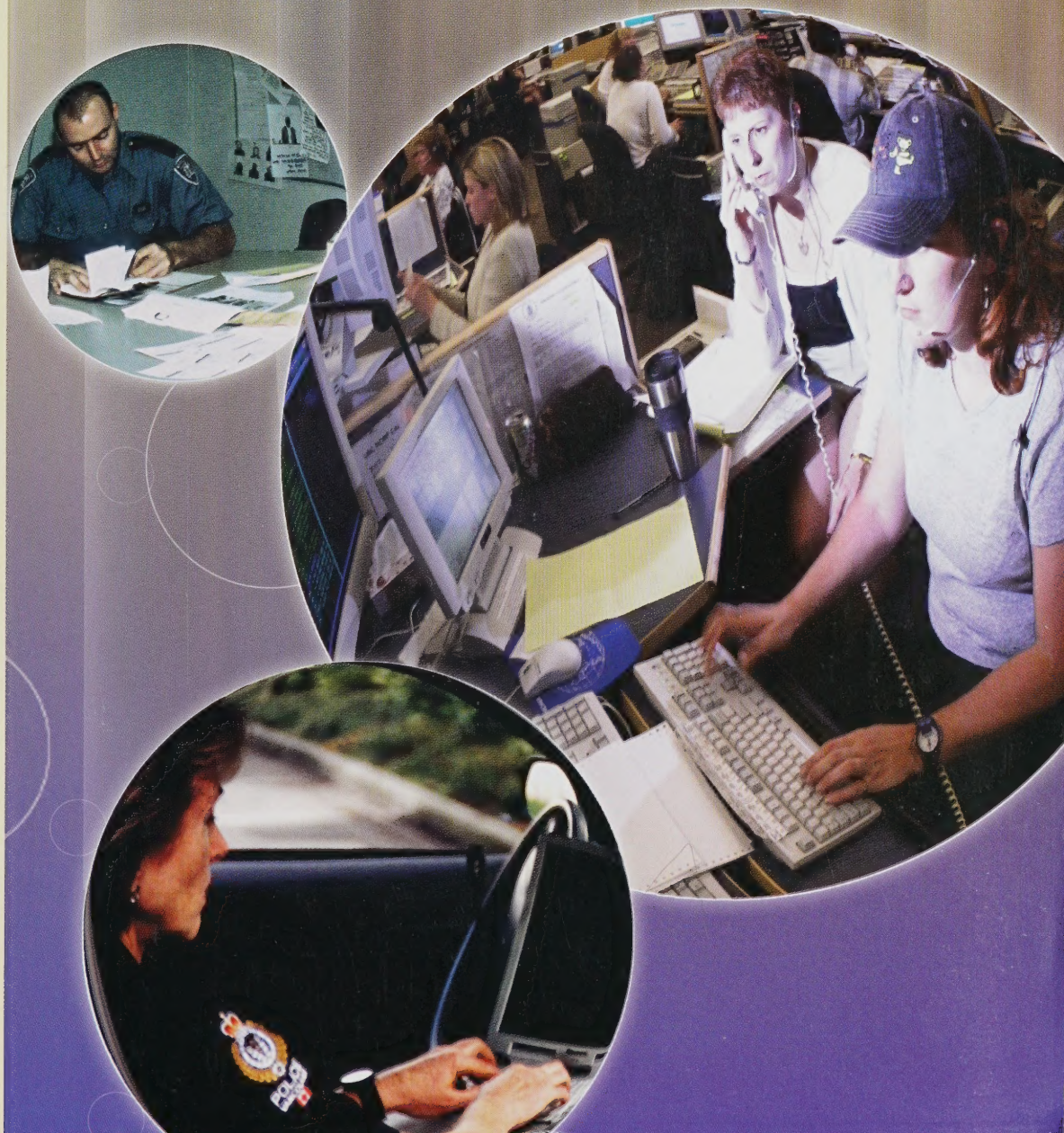

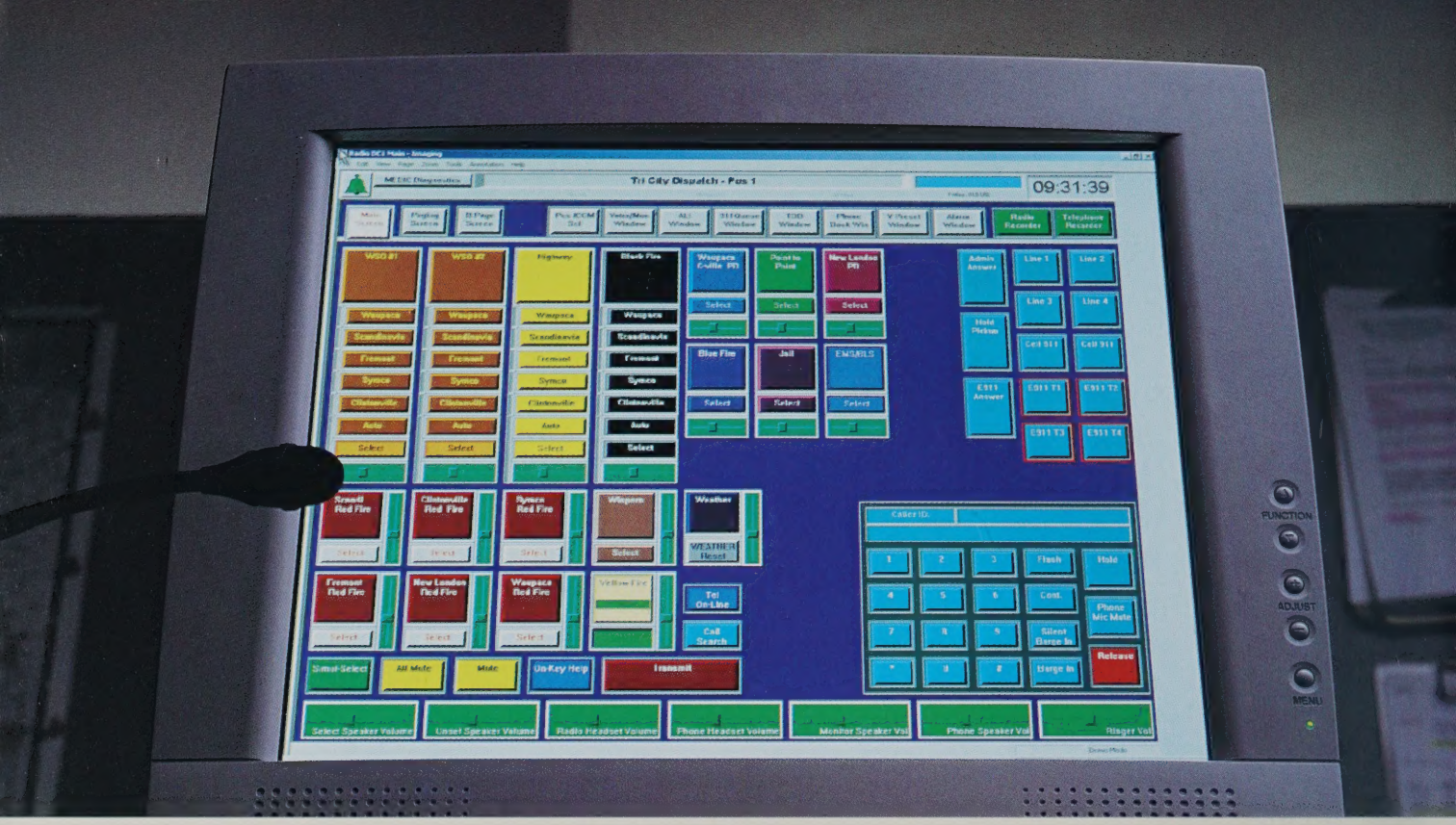

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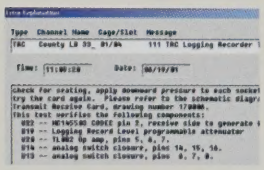

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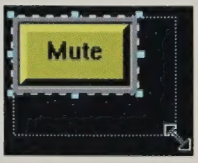

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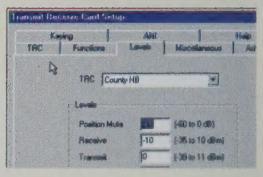

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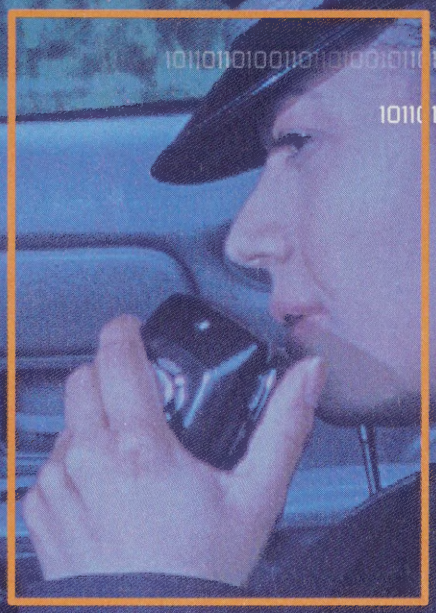

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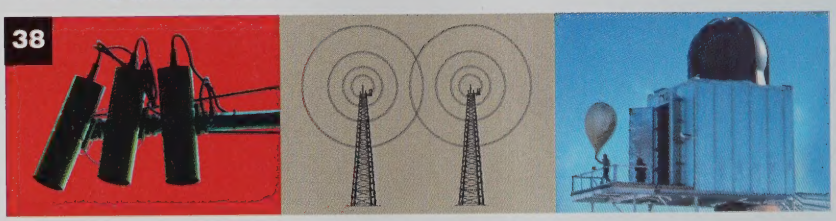
CIRCLE #2

RadioResource MAGAZINE

August 2002
Vol. 17, No. 7

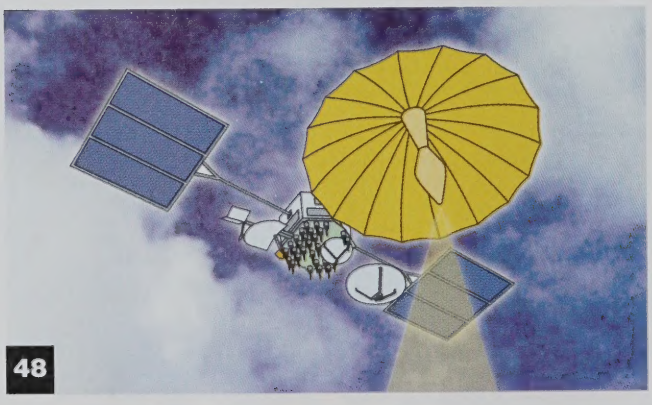
Frequency Coordination 28
Now that the FCC has put its frequency licensing databases into the public's hands via the Universal Licensing System, questions arise concerning the future of frequency coordinators. Here's what the leading coordinators have to say about that. *Compiled by Jeffrey Elliott*

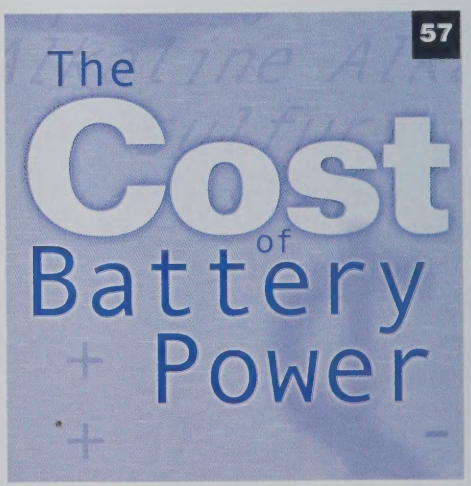
<< mobiledata >>



Innovative Wireless Solutions 38
From airborne transceivers to simulcast to video surveillance, wireless technology is pushing forward into uncharted territory. *Stories by Aleah Mickelson, Jean-Paul Saindon, and David Cahill*

Telematics and Automated Fleet Management 48
Telematics is revolutionizing the way fleet managers do business. Before committing to a technology, however, make sure to weigh your options. *By Michael Mathews*





The Cost of Battery Power 57
The 1990s brought many improvements to batteries in terms of higher energy densities and lower costs.
By Isidor Buchmann

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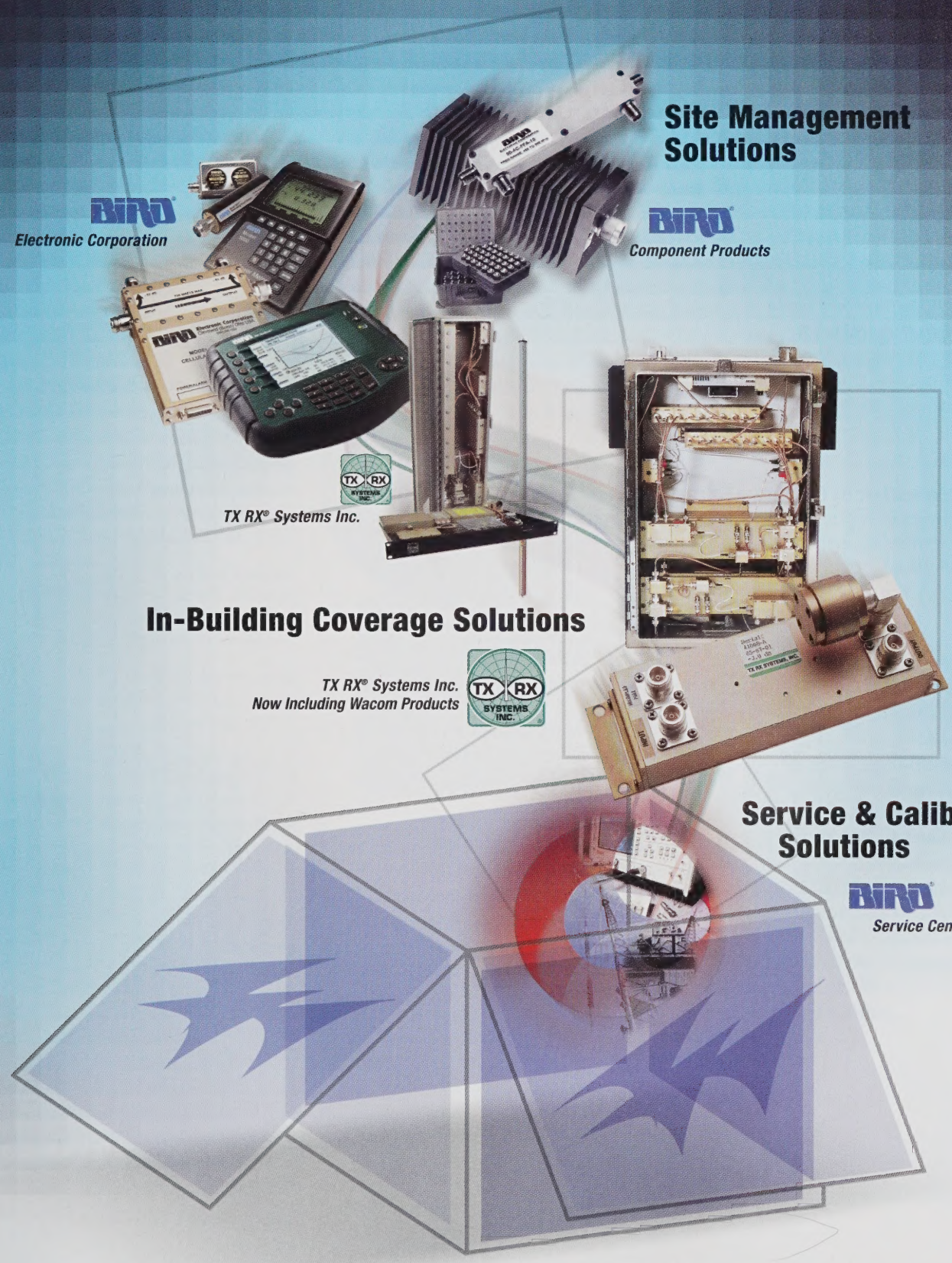

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CIRCLE #3

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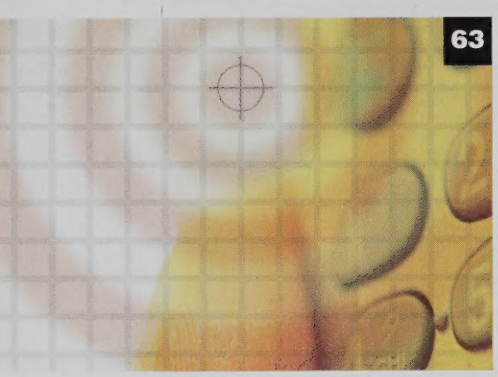

PUBLIC SAFETY REPORT

The Fine Line Between Location-Based Services and Privacy 63
Concerns over the privacy and security of location-based services continue to plague the nascent sector. *By Shereen Fink*

Mission Possible 72
It's never an easy transition to a new mobile computing platform, but for the Vancouver (B.C.) Police Department, the effort has proven worthwhile. *By Jim Chu*

The Evolution of CAD 82
As CAD technology continues to develop, many agencies are outgrowing their once state-of-the-art systems. *By Kathy Imel*

Cooperation Equals Interoperability 90
Interest in Project 25 standards and technology has increased dramatically over the last year. And to meet this heightened customer demand, manufacturers are revving up production. *By Craig Jorgensen*

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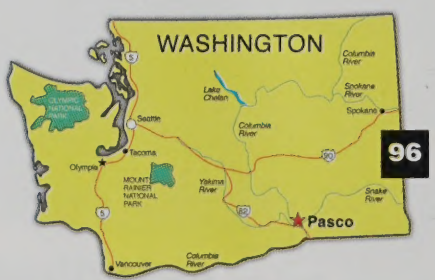
Tuscaloosa County, Ala., is known for its rich Appalachian heritage. However, it should also be recognized for its high-tech approach toward public safety and law enforcement. *By Michael Smith*

Crime Fighter 96
Mobile data meets community policing in the crime-ridden city of Pasco, Wash. *By Jan Jackson*



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The FCC has decided to convert seven spectrum bands from federal to non-federal use. *By Ralph Haller*

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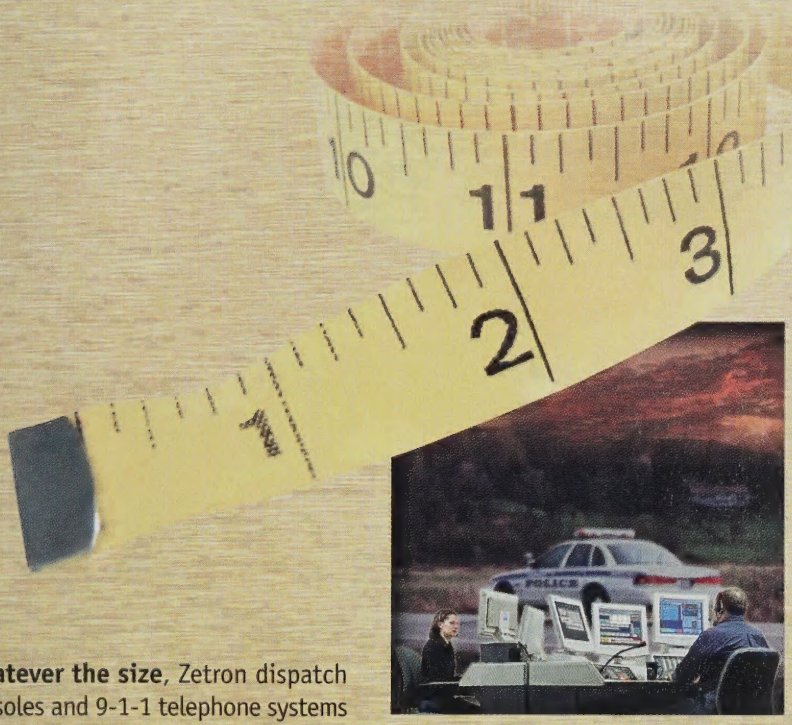

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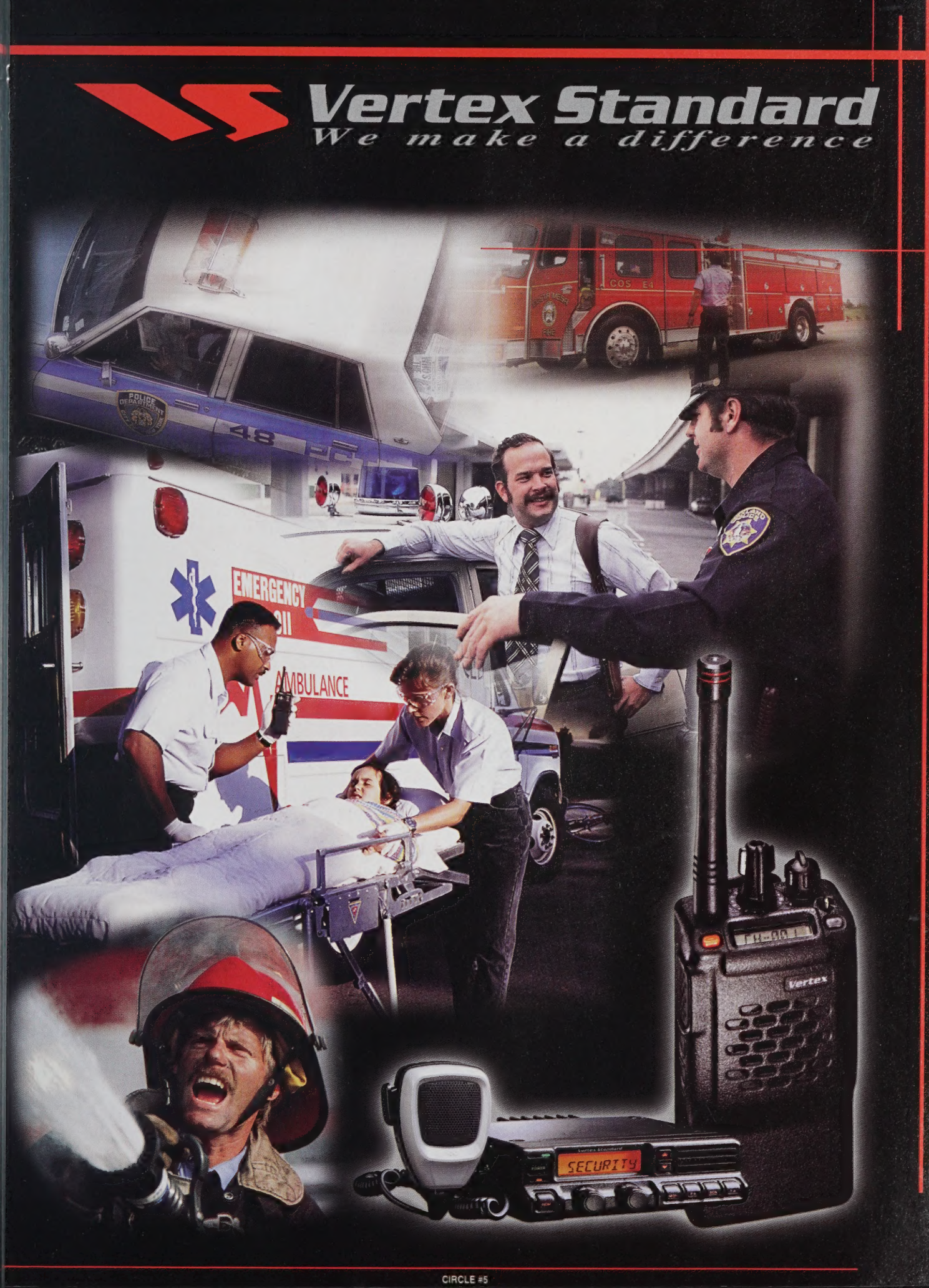
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CIRCLE #5

Homeland Security and the "First Responder"

In the context of homeland security, what exactly is a first responder?

Bill Moroney, president and CEO of the United Telecom Council (UTC), an association representing the telecom interests of utilities, oil and gas pipeline operators, and other critical infrastructure organizations, presented that very question to me. Caught off guard (after all, I'm the one who should be asking the questions), I paused to digest his query.

"Pardon me, Bill, but surely you heard President Bush introduce the new Department of Homeland Security just the other day. He explicitly stated that we need more support for our emergency first responders: local police, firefighters, and emergency medical professionals," I wanted to say but didn't, sensing the rhetorical nature of his question and guessing he would have worked my answer like a 5-4-3 double play.

He continued on his course, to my dismay, with another question that went like this: "There is an explosion caused by a gas leak. Lives, homes, and businesses are at risk, yet an emergency response cannot begin until someone from the gas company *first responds* to turn off the gas. Do they qualify as a first responder?"

This time I spoke, but only to offer a weak "Yes, I guess it does."

Moroney isn't challenging our nation's system of emergency response, or even the president's definition of a first responder, per se. Rather, he is calling attention to the need for a general shift in perspective. In addition to the importance placed on the role of traditional public safety responders in emergencies, shouldn't we also include various other individuals that, on one level or another, protect the public?

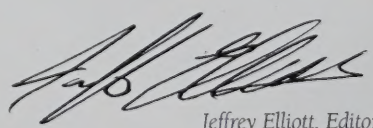
Perhaps. But in that case, shouldn't we expect interoperable communications among *all* our first responders? Yet, often there is a lack of interoperability among the various public safety organizations in one area, let alone among agencies responding from other jurisdictions. Add to that some recent cases where digital radios simply have not worked during emergencies and the complex issue of interference in the 800 MHz band, for which nearly everyone has a different solution, and the wireless industry has, to put it mildly, a challenge on its hands in providing its critical service to homeland security efforts.

I applaud the efforts of the Assoc. of Public-Safety Communications Officials (APCO) Intl., Public Safety Wireless Network (PSWN), National Telecommunications and Information Admin. (NTIA), American Mobile Telecommunications Assoc. (AMTA), and UTC, all of which recently held events focusing on the aforementioned challenges. While attending most of these forums, however, I heard too much discussion of what each organization is doing individually to solve the problems and too little about what must be done collectively.

I implore the wireless industry to get to the table — unencumbered with an agenda driven only by membership interests — to discuss a corporate response to critical issues such as interoperability and interference in an effort to help our first responders succeed.

On another note, I'm pleased to introduce the newest member of the *RadioResource* family, Assistant Editor Steven Bromby. Steven has taken charge of our massive company database and has set about the thankless job of making sure it is up-to-date. To providers of mobile and wireless products and services: Help keep our magazine the leading source of company information by responding to Steven's update requests.

Here's to all the first responders, whoever they may be!



Jeffrey Elliott, Editor

I'd love to hear your thoughts on this column and the rest of the August issue. Please e-mail your feedback to me at jelliott@radioresourcemag.com.

RadioResource

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CIRCLE #6

Special of the Day: Freshly Reallocated Morsels of Spectrum

By Ralph Haller

Here's some good news for spectrum-starved users: The FCC has made a decision on how to assign the 27 megahertz of spectrum being converted from federal to non-federal use. Seven spectrum bands are included in the transfer, and each band has been designated for a particular type of use and licensing scheme, some of which may potentially help the private radio user. The plan is as follows:

216-220 MHz. This band is already licensed to non-federal services, including amateur radio service, automated maritime telecommunications service (AMTS), and the interactive video and data service (now called the 218-219 MHz service), but new site-by-site telemetry service was recently authorized as well. The FCC is also planning to hold an auction to license the AMTS frequencies nationwide. Another auction in the works will license the 218-219 MHz service band in areas of the country not currently licensed. At this point, it is not entirely clear how the FCC will license new site-by-site telemetry stations on auctioned spectrum and protect the rights of the auction winners.

1390-1392 MHz. The FCC will allow spectrum to be auctioned in 52 major economic areas (MEAs). Licensees will be required to provide substantial service to their MEAs within 10 years. Licenses could be partitioned or disaggregated by the auction winner, providing spectrum opportunities for private use.

1392-1395 MHz paired with 1432-1435 MHz. Spectrum will be auctioned by six economic area groupings (EAGs). Licensees will be required to provide substantial service to their EAGs within 10 years, and licenses could be partitioned or disaggregated by the auction winner, which could provide spectrum opportunities for private use.

1427-1429.5 MHz. This spectrum currently houses medical telemetry equipment that traditionally operated in the 450-470 MHz low-power offset channels in the business radio service band. The FCC plans to continue using the spectrum primarily for medical telemetry, but will also allow site-by-site telemetry operations.

1429.4-1432 MHz. Spectrum will be used by telemetry operations utilizing a frequency-coordinated, site-by-site licensing approach. This band could provide opportunities for utilities and others that have a need to transmit telemetry.

1670-1675 MHz. The FCC has decided to assign spectrum on a single, nationwide basis via an auction. Licensees could partition or disaggregate their license.

2385-2390 MHz. This spectrum will also be assigned on a single, nationwide basis by way of an auction. Licensees could partition or disaggregate their license.

Like so much of the spectrum already auctioned, these bands include many incumbent users who must be protected by the auction winners. Unlike in previously auctioned spectrum, however, in which incumbents have also been FCC licensees, many of the incumbents in the designated bands are federal government entities. Many government operations will be permitted to continue in the bands and must be protected. So, even after the spectrum is purchased in the auctions, the federal government will have the ultimate say over where it can actually be used. Given that the federal radio user database is not available to the public, it will be very difficult to determine exactly what is being offered in the auctions.

Even after the spectrum is auctioned off, the federal government will still have ultimate say over where it can be used.

Television Channels 60-69 (746-806 MHz) Auction Delayed

Reacting to pressure from Congress and industry, the FCC delayed the wideband auction of the remaining spectrum in the 700 MHz band. The FCC has already designated 24 of the 60 megahertz in the band for public safety use and another six megahertz has been auctioned to guard band managers.

The remaining 30 megahertz, which had been scheduled for auction on June 19, 2002, is now scheduled to hit the auction block on January 14, 2003. The delay provides an opportunity for Congress and the FCC to reconsider whether the remaining spectrum should be auctioned as originally planned or be designated for some other use such as public safety. This auction already has been delayed several times. It will be interesting to see whether it ever occurs.

RF Safety

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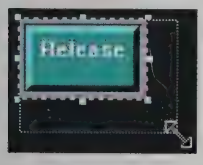

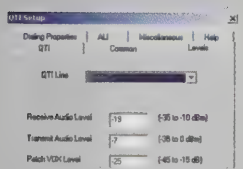

System changes can now be made by the customer instead of expensive factory programmers. Levels on an E911 Trunk are easily adjusted.

The E911 component of the new UltraCom™ E911/ Radio Dispatch Console System is the easiest for telecommunicators to learn and use. All screen buttons are in plain text, no icons. Our 100% user programmable touch screens can be easily set up to accommodate any situation. And on-board help is always just a key stroke away.

This is an all digital, 32-bit Windows, single application system. Telcordia and NENA compliant handling both E911 and ADMIN lines. Built from the ground up. by us - not a collection of older multiple systems.

The UltraCom includes over $25,000 worth of Management Information software built in at no extra cost. Data is buffered at each position saving the expense of redundant servers. E911 data is archived on DVD-RAM. CAD/Mapping can be provided. Software upgrades are always free.

Every UltraCom E911 console system contains all the software necessary for a state of the art radio dispatch system. The only cost is hardware - saving as much as 50%.

To help your telecommunicators overcome complexity when seconds count, contact Moducom today.

MEDIC Diagnostics

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Radio dispatch is part of the UltraCom system software. This means you only need to add minimal hardware to obtain a single application E911 and radio dispatch console system.

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See Us at the APCO Show, August 11-15, Booth #1460 CIRCLE #7

case not everyone got the word, here it is. At a seminar held on RF safety just prior to the IWCE show in Las Vegas in April, Jerry Ulcek, who is in charge of the FCC's RF compliance program, announced that the commission plans to begin enforcing its rules on human RF safety.

Although the rules went into effect in September 2000, the FCC has not actively enforced the rules, giving everyone a chance to come into compliance. Since that time, the FCC has been training its enforcement staff and acquiring measurement equipment. Don't be surprised to see the FCC issue some fines for noncompliance in the near future. For more information, visit the Web site www.fcc.gov/oet/rfsafety.

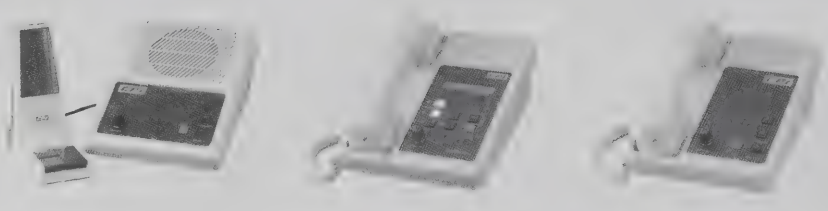
Junk Fax Prohibition

Another side note: If you are using the fax machine to send out unsolicited advertisements for business, you should be aware that the practice is against federal law. The Telephone Consumer Protection Act of 1991 and FCC rules prohibit use of fax machines, computers, and other devices to send unsolicited advertisements to fax machines (47 U.S.C. § 227(b)(1)(C) and 47 C.F.R. § 64.1200(a)(3)).

An unsolicited advertisement is defined as, "any material advertising the commercial availability or quality of any property, goods, or services which is transmitted to any person without that person's prior express invitation or permission." (47 C.F.R. § 64.1200(f)(5)) An established business relationship, however, demonstrates consent to receive fax advertisement transmissions. (10 FCC Rcd 12391, 12408, § 37 (1995)). For more information, download Public Notice #DA 01-462 from the FCC's Web site (www.fcc.gov). The FCC says it has already imposed fines in excess of $1.5 million for violation of the "junk fax" law. ■

Ralph Haller served as chief of the FCC's Private Radio Bureau for more than eight years. He is president of Fox Ridge Communications in Gettysburg, Pa. You may contact him at rhaller@frci.com or (717) 334-7991.

Need remotes? Call Us



CPI manufactures a complete line of DC, Tone, Local Extension, Multi-Channel, and Multi-Line remotes and termination panels for most radio systems.

The CPI line of Multi-Channel remotes include systems for the Kenwood -80 (TSR412/TSP402) and -90 (MCP411/MCP401) series and many Motorola models including the CDM1550(LS), (MCR211A/MCP200C) and the M1225 Series. For additional information on the complete CPI line of products please call us or visit our website.

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CIRCLE #10

BUSINESS

Dallas Convention Bureau

Dallas' 3-1-1 System Empowers Mobile Workers

The city of Dallas completed the first phase of its new $5 million 3-1-1 non-emergency customer service request (CSR) service that enables the city's mobile workforce to receive citizen requests wirelessly in the field. The rollout includes Motorola's CSR 3.7 software and 162 mobile workstations (154 Motorola MW520 workstations and eight Panasonic Toughbook laptop computers).

Before Dallas implemented the new system, requests that came into the 3-1-1 center were entered into a system and the order was printed out and manually delivered to the appropriate department. Now when a citizen dials 3-1-1 or accesses the city's CSR system via the Internet, their request is electronically tracked and routed through a dispatcher to the appropriate city department. If required, the request is wirelessly sent to the field where it can be addressed by a mobile worker. Customers are then provided with a service request number and an anticipated response time.

The first phase of the rollout pertains to code compliance, water utilities, public works and transportation, sanitation, and street service issues — areas that receive 75 percent of citizen requests. More than 700 employees representing 33 departments are on the system. "The CSR system will allow us to take action more quickly, track employee efforts more efficiently, and ensure the effective delivery of service," said Dan McFarland, CIO for the city of Dallas.

New Radio Company Formed

A group of wireless industry professionals have formed a new company to manufacture and sell conventional and trunked repeaters and base stations to commercial radio and business and industrial/land transportation network operators, as well as local and regional governments. The Houston-based company, called DUR-TEK, will also provide paging transmitters and network services, with offerings ranging from component-level equipment to complete turnkey communications systems. DUR-TEK's line of trunking equipment supports major protocols including LTR, SmarTrunk II, and MPT-1327. The new company's president is Fred Goodwin, a former SMR operator who has held top positions with a radio manufacturer, General Electric, and Uniden.

Aeroflex Completes IFR Acquisition

Aeroflex Inc., a Plainview, N.Y.-based manufacturer of communications testing equipment, announced that it completed its $60 million acquisition of IFR Systems Inc. With the acquisition, Aeroflex gains an additional line of wireless test equipment for the communications and avionics industries.

Proxim to Buy Networking Unit from Agere

Wireless networking provider Proxim announced its intentions to acquire Agere System's Wi-Fi (802.11) wireless LAN equipment business for $65 million in cash. The acquisition includes the Orinoco product, a line of enterprise networking equipment, strengthening Proxim's position as a manufacturer of wireless infrastructure products. Meanwhile, Agere retains its Wi-Fi component business, which includes network chips, modules, and cards.

RIM Files Suit Against Good Technology

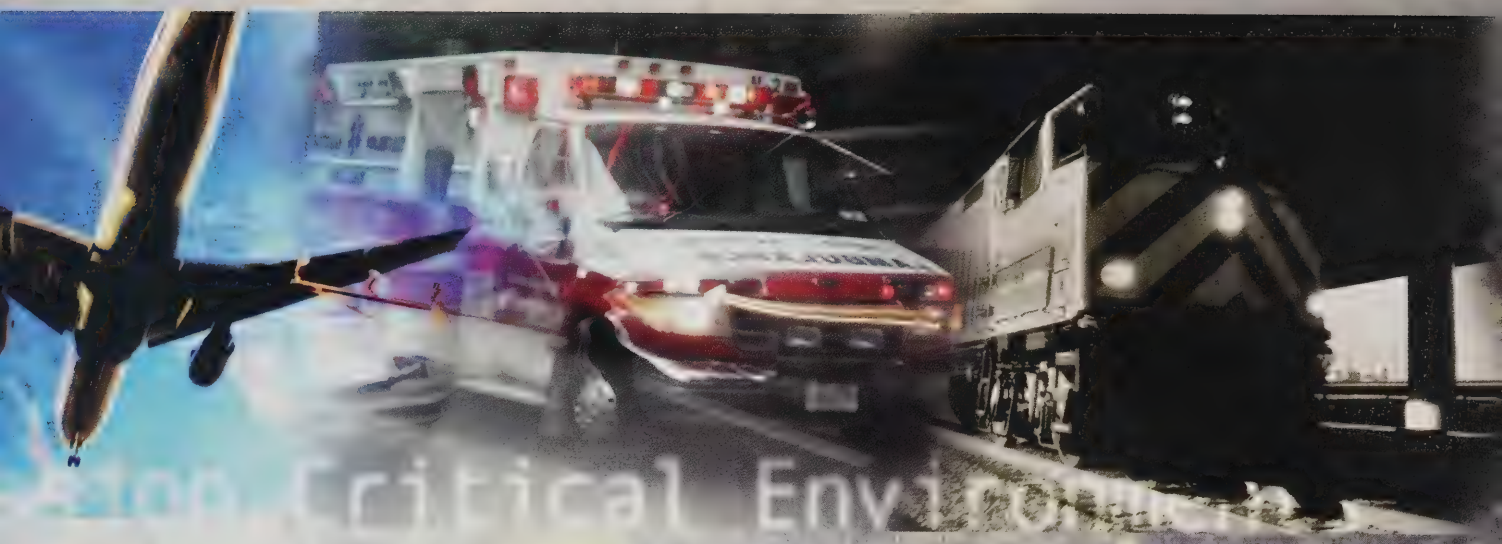
Research In Motion (RIM), the developer of the popular BlackBerry wireless e-mail messaging device, has filed a patent-infringement suit against Good Technology, a startup company that has developed a rival wireless e-mail system. According to RIM, Good Technology is infringing on a patent covering the way RIM manages its wireless data applications from a central host. "We welcome fair competition, but we condemn copycat technology that violates our intellectual property rights as Good Technology is doing," said Mark Guibert, vice president of marketing for RIM.

@Track Communications to Become Minorplanet

@Track Communications Inc. announced it is changing its name to Minorplanet Systems USA Inc. to reflect the company's "strategic focus on developing the North American vehicle management information marketplace, which exceeds 21 million vehicles in the United States alone," said company President and CEO Jana Ahlfinger Bell. The company's majority shareholder is Minorplanet Systems plc based in the United Kingdom.

Sierra Wireless, Motorola Cut Staff

Wireless data communications equipment provider Sierra Wireless is once again undergoing a corporate restructuring to "size the company's operating expenses to current and visible demand and with the expectation of accelerating its return to profitability," according to a company statement. The company



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Airborne Express Deploys New Mobile Data System

Beginning a massive wireless data system rollout, Airborne Express completed the initial deployment phase of its new wireless data system, replacing its aging two-way radio communications system for dispatch operations and separate scanning devices used to track packages.

Approximately 3,000 Motorola 500 Series handheld terminals have been distributed to Airborne Express drivers in Chicago, Dallas, Houston, Los Angeles, and Seattle. The new data system allows package-tracking information to be scanned into the device by the driver, which is then relayed to Airborne's main shipment-tracking system. There may be as many as 20,000 users when the complete system is rolled out.

"This new system releases our drivers from dependence on any vehicle-mounted technology and enables us to relay information throughout the system

in real time," said Bill Ashby, vice president of field operations for Airborne.

The company began designing the ruggedized terminals with Motorola five years ago. Data will be sent via two public wireless networks, depending on the geographical region the device is used in.

plans to reduce its workforce to 180 from 275. Sales of Sierra's core product, the AirCard series of wireless data modems, are likely to be significantly lower than previously expected, the company said.

Meanwhile, Motorola also announced it is cutting its staff. The company plans to eliminate approximately 7,000 more jobs by year-end as it aims to trim expenses by an additional 20 percent. The company will take a $3.5 billion charge for the action, 90 percent of which will be taken in the second quarter. At its peak in August 2000, Motorola employed about 150,000 workers. Following the most recent round of layoffs, the company will have approximately 100,000 employees.

Organization Formed to Promote Mobile Services

Approximately 200 mobile operators, device manufacturers, network equipment suppliers, and content providers have joined together to form the Open

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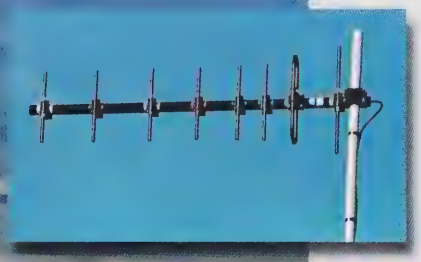

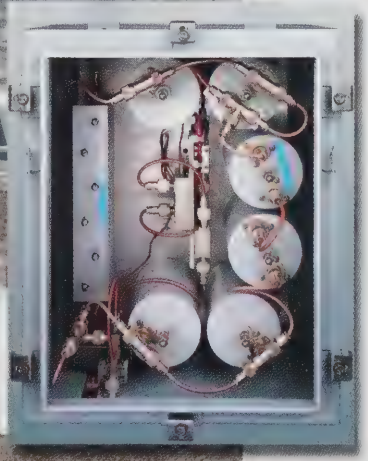

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CIRCLE #13

Mobile Alliance. This new global organization will collect market requirements and define technology specifications in an effort to promote interoperability among mobile information and communication services. Notable members include Nokia, Motorola, Microsoft, and NEC Corp., among others.

"Like GSM with voice, OMA will deliver the specifications required for a commercially solid system for mobile services, with clearly defined open and interoperable application programming interfaces," said Pertti Korhonen, senior vice president of mobile software for Nokia. "This global approach will fuel innovation and make the mobile platform an attractive one for creating both services and content."

Looking for new sales opportunities in a difficult market? Enhance your customers' communications systems by offering the SmarTrunk II Digital Trunking System. Ideally suited for private "campus" systems, SmarTrunk II offers all the benefits of modern trunking technology at a very reasonable cost:

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- Increased system loading with a higher level of service.

How about interconnecting with the company PABX? No problem with SmarTrunk II, since telephone interconnect is a standard feature. Now mobile employees can easily call office workers or even access the PSTN through the office switchboard.

Since SmarTrunk II is an "overlay" system, it can be easily added to an existing conventional radio system (up to 16 channels). The ST-853 SmarTrunk II controller is compatible with any base station or repeater, while SmarTrunk II mobile logic boards are available for many popular radio models from Icom, Kenwood, Motorola and Vertex/Standard. And with the new ST-510 Wide Area Network Switch, different campus sites can even be linked together into a single, integrated communications network.

Call us or visit our web site today to learn more about how you can increase your sales with SmarTrunk II, the industry's most widely used VHF/UHF radio trunking system.

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CIRCLE #14

REGULATORY

Bush Signs Bill to Delay 700 MHz Auction

At the behest of Congress and most of the wireless industry, President George W. Bush signed a bill to delay the auction of the upper 700 MHz band, as well as blocks A, B, and E in the lower 700 MHz band. However, the law does allow for the auction of 18 megahertz of spectrum in blocks C and D in the lower 700 MHz band. This auction of 740 licenses is set to commence on Aug. 27, and proceeds from the auction must be turned over to the U.S. Treasury by Dec. 31.

The last-minute, unanimous action by both the House and Senate to pass the bill, and subsequent presidential blessing on June 19, blocked the FCC from proceeding with the auction, which was scheduled to begin the same day.

In early June, the FCC, bowing to industry consensus, granted a temporary delay of Auction No. 31 for the upper 700 MHz band until Jan. 14, 2003, while staying on course with Auction No. 44 for the lower 700 MHz band, which is aimed at rural carriers. Much controversy has surrounded the auctioning of spectrum in the 700 MHz band, currently occupied by TV broadcasters operating on channels 52-69, because they are not required to vacate their spectrum until 2007 or until 85 percent of households have digital TV, whichever comes later. It remains to be seen, however, just when the remaining 60 megahertz of spectrum in the television bands will be auctioned off.

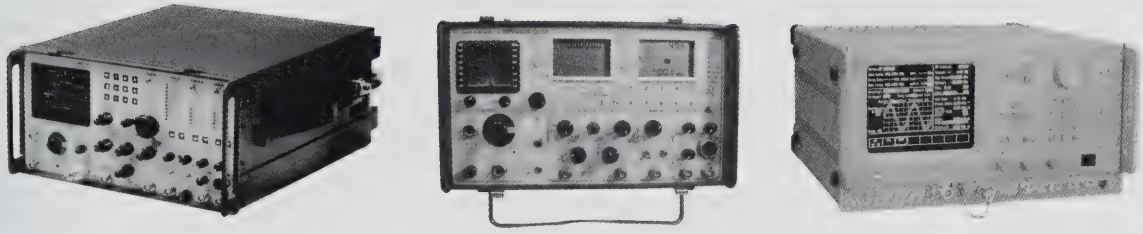
Also written into the law is an elimination of the deadlines created by Congress for the auctioning of spectrum in the 1.7 GHz and 2.1 GHz bands and a requirement that the FCC must update Congress as to when UHF-TV broadcasters' transition to digital will take place.

FCC Denies Petitions on 700 MHz Use

On June 14 the FCC adopted a memorandum opinion and order regarding reallocation and services rules for the 698-746 MHz spectrum band, which is currently occupied by TV channels 52-59. The

(continued on page 24)

Same products. Same people. Same reliability.



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Utilities Explore Wireless Upgrades

What would it cost to upgrade your utility's wireless communications system? According to a study released by the United Telecom Council (UTC) and KPMG, you can expect to pay in excess of $25 million if you are a large utility, figuring the cost of new handsets and site infrastructure.

Of course, there are many factors to consider when estimating how much a wireless overhaul will cost and whether it makes sense for your organization to undertake a wireless upgrade. The consensus of industry analysts who compiled the study, however, is that now may be the appropriate time to upgrade your wireless system, given the heightened state of concern regarding the United States' critical infrastructure and the importance being placed on secure, mission-critical communications.

"The thing that stands out the most to us from this study is that there is great opportunity for critical infrastructure to make significant progress toward upgrading to new and enhanced wireless networks," said Daniel Rizer, managing director of KPMG Consulting.

There is a caveat: Utilities rarely upgrade just for the sake of it. There must be evidence of concrete benefits, which is sometimes hard to come by. "Realizing tangible benefits can often prove challenging," Rizer said. "Without some type of catalyst, the industry is likely to rely on older wireless systems with upgrades occurring on an one-off basis."

The study does manage to qualify, in relative depth, potential benefits of upgrading a wireless communications system as well as the costs associated with the overhaul. To obtain a copy of the report, contact the UTC research department at (202) 872-0030 or visit their Web site at www.utc.org.

Potential Benefits Associated with Upgrading Wireless Systems

Cost Reduction	Improving scheduling and dispatch	Consolidate dispatch offices
		Reduce number of dispatchers and supervisors managing field crews
	Reducing reliance on paper	Utilize electronic work orders and maps to eliminate manual processes
		Reduce volume of paper required to support field crews
	Reducing drive time	Reducing typical windshield time of 30 to 40 percent of shift to increase number of completions
	Eliminating reworks	Provide real-time access to work order information and customer account data (ensure worker has right information, tools, parts, etc. to complete job before arriving at job site)
	Eliminating process redundancies	Leverage field applications to eliminate redundant steps, reduce paperwork and, consequently, reduce customer response time
	Consolidating operational facilities	Consolidate functions such as dispatch and service centers to reduce lease expenses, property taxes, building maintenance, and other real-estate-related costs
	Reducing vehicle costs	Leverage more effective fleet management to reduce vehicle maintenance and to reduce overall vehicle requirements
	Consolidating wireless devices	Reduce purchase cost of multiple devices
		Eliminate recurring costs of commercial wireless devices (e.g., cellular, paging, data units)
	Reducing wireless system maintenance costs	Reduce frequency of repair
		Reduce amount of stores and replacement parts used

CIRCLE #16

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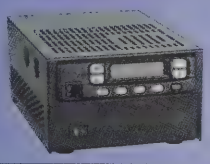

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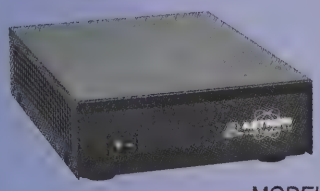
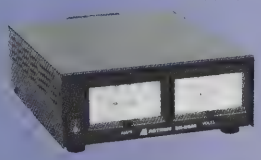


MODEL SS-18

DESKTOP SWITCHING POWER SUPPLIES

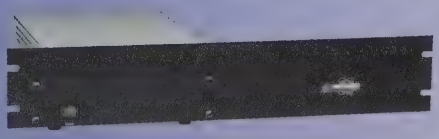
MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-10	7	10	1⅛ x 6 x 9	3.2
SS-12	10	12	1⅜ x 6 x 9	3.4
SS-18	15	18	1⅜ x 6 x 9	3.6
SS-25	20	25	2⅞ x 7 x 9⅜	4.2
SS-30	25	30	3¾ x 7 x 9⅜	5.0



MODEL SS-25M

DESKTOP SWITCHING POWER SUPPLIES WITH VOLT AND AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SS-25M*	20	25	2⅞ x 7 x 9⅜	4.2
SS-30M*	25	30	3¾ x 7 x 9⅜	5.0



MODEL SRM-30

RACKMOUNT SWITCHING POWER SUPPLIES

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-10	7	10	3½ x 19 x 9⅜	4.3
SRM-12	10	12	3½ x 19 x 9⅜	4.7
SRM-18	15	18	3½ x 19 x 9⅜	5.0
SRM-25	20	25	3½ x 19 x 9⅜	6.5
SRM-30	25	30	3½ x 19 x 9⅜	7.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M	20	25	3½ x 19 x 9⅜	6.5
SRM-30M	25	30	3½ x 19 x 9⅜	7.0

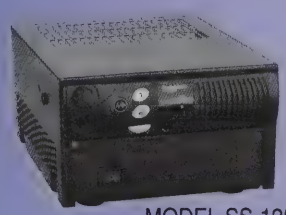
MODEL SRM-30M-2

2 ea SWITCHING POWER SUPPLIES ON ONE RACK PANEL

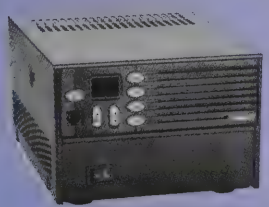
MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25-2	20	25	3½ x 19 x 9⅜	10.5
SRM-30-2	25	30	3½ x 19 x 9⅜	11.0

WITH SEPARATE VOLT & AMP METERS

MODEL	CONT. (Amps)	ICS	SIZE (inches)	Wt.(lbs.)
SRM-25M-2	20	25	3½ x 19 x 9⅜	10.5
SRM-30M-2	25	30	3½ x 19 x 9⅜	11.0



MODEL SS-12SM/GTX



MODEL SS-10EFJ-98

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EF JOHNSON AVENGER GX-MC42
EF JOHNSON GT-ML81
EF JOHNSON GT-ML83
EF JOHNSON 9800 SERIES
GE MARC SERIES
GE MONOGRAM SERIES & MAXON SM-4000 SERIES
ICOM IC-F11020 & IC-F2020
KENWOOD TK760, 762, 840, 860, 940, 941
KENWOOD TK760H, 762H
MOTOROLA LOW POWER SM50, SM120, & GTX
MOTOROLA HIGH POWER SM50, SM120, & GTX
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MOTOROLA RADIUS & GM 300
UNIDEN SMH1525, SMU4525
VERTEX — FTL-1011, FT-1011, FT-2011, FT-7011

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SS-18GX
SS-12EFJ
SS-18EFJ
SS-10-EFJ-98, SS-12-EFJ-98, SS-18-EFJ-98
SS-12MC
SS-10MG, SS-12MG
SS-101F, SS-121F
SS-10TK
SS-12TK OR SS-18TK
SS-10SM/GTX
SS-10SM/GTX, SS-12SM/GTX, SS-18SM/GTX
SS-10RA
SS-12RA
SS-18RA
SS-10SMU, SS-12SMU, SS-18SMU
SS-10V, SS-12V, SS-18V

*ICS – Intermittent Communication Service

CIRCLE #17

(continued from page 20)
order comes in response to petitions for reconsideration filed by eight parties that were seeking changes and/or clarifications to the commission's Lower 700 MHz Memorandum Report and Order that reallocated 48 megahertz of spectrum in the band to fixed and mobile services and retained the existing broadcast allocation for both new broadcast services and incumbent broadcast services during the transition to digital TV.

In the opinion and order, the FCC denied the petitions and affirmed its position regarding the original 700 MHz band plan.

One petition that was denied was filed by the Office of the Chief Technology Officer for the District of Columbia requesting that public safety users be permitted to obtain exclusive lower 700 MHz band licenses under the public safety radio services auction exemption as stated in the Telecommunications Act of 1996. The FCC said it declined to restrict spectrum to only public safety or private radio uses in favor of a policy that favors disseminating licenses "among a wide variety of applicants."

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T-5

CIRCLE #18

ASSOCIATION HIGHLIGHTS

PLCA Gets First President

Alan Shark, president and CEO of the American Mobile Telecommunications Association (AMTA), was named president of the newly formed Power Line Communications Association (PLCA), a trade group formed by electric utilities interested in using power lines for broadband communications services. Shark also serves on the *RadioResource Magazine* editorial advisory board.

Headquartered in the Washington, D.C., area, PLCA will be managed administratively with AMTA. PLCA's mission is to "promote the common interests of organizations involved in power line communications (PLC); deal with emerging issues as an advocate for the PLC industry; educate and work with policy-makers; and generally improve business conditions in the PLC industry."

UTC Elects New Board Members

The United Telecom Council (UTC) named Bernard Jacob, director of information security and program management for Southern Co. in Atlanta, as its new chairman at the UTC annual membership meeting in Las Vegas in June. "The companies that own and operate the critical infrastructure that supports our nation are faced with even more challenges since Sept. 11," Jacob said. "My goal as chairman will be to make UTC an even stronger advocate for its members to help them meet those new challenges head on."

Jacob replaces Jerry Obrist, chief engineer of Waterworks at the Lincoln Water System in Lincoln, Neb. Obrist will serve as chairman of UTC's forward planning committee. Other members elected to the board of directors include

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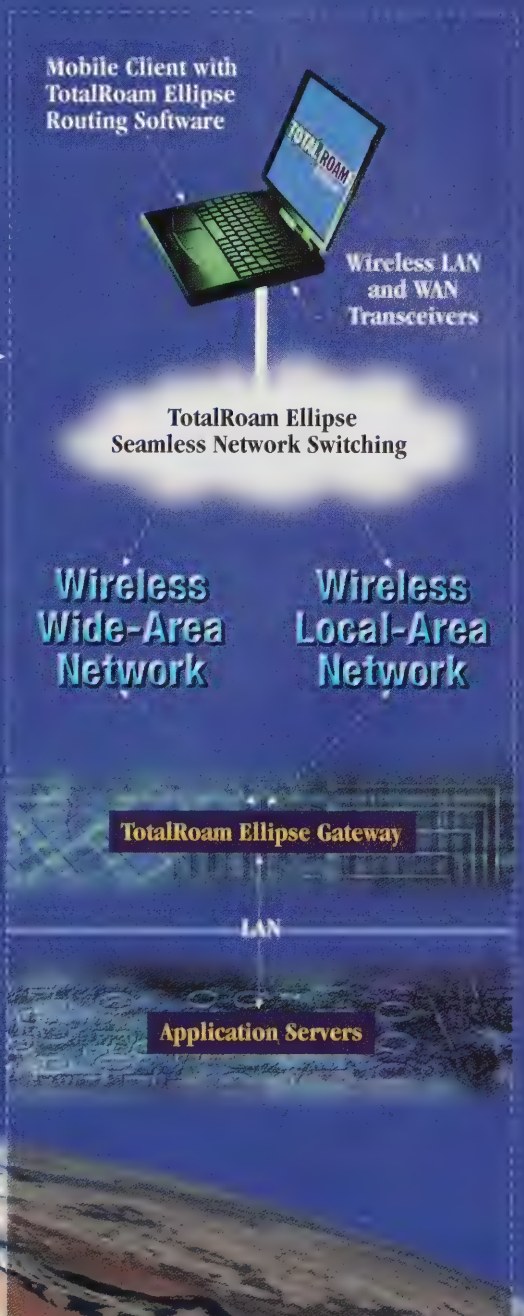

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Vice Chairman Jim Stahl from PacifiCorp in Portland, Ore., who was most recently chairman of UTC's technical division, and Ken Campbell, senior network consultant at American Electric Power in Columbus, Ohio, who was reelected to a second term as UTC's secretary/treasurer.

Interference at AMTA Leadership Conference

Discussions about how to mitigate interference to public safety communications in the 800 MHz band dominated the American Mobile Telecommunications Association's (AMTA) two-day leadership conference in Washington, D.C. Leaders from the SMR, private wireless, and public safety communications industries met to discuss the state of the wireless industry and current issues facing carriers, manufacturers, and users.

With the current interest in the FCC's notice of proposed rulemaking (NPRM) that seeks comments from industry on how to resolve interference at 800 MHz, AMTA created a lineup of presenters representing the heart of the controversy including Nextel Vice Chairman Morgan O'Brien, Association of Public-Safety Communications Officials (APCO) International outgoing President Glen Nash, and UTC President and CEO Bill Moroney. "Public safety requires more spectrum now, and the only place they are going to find spectrum now is in the 800 MHz band," said O'Brien, reiterating his company's position that rebanding the 800 MHz band is a necessary solution to the interference problem.

Though all speakers agreed that resolving interference to public safety is mandatory and must be done quickly, they were miles apart in how to accomplish this goal. "Rebanding proposals don't make sense," UTC's Moroney said. "Instead of rebanding, UTC is looking at a market-based solution." In the interest of its members, UTC would like to see a resolution that does not require a massive restructuring of the 800 MHz band, rather focusing on a retuning of equipment to solve interference.

CANADIAN NEWS

Industry Canada, FCC Sign MDS Agreement

Industry Canada and the FCC have signed an interim arrangement intended to facilitate the development of multipoint distribution systems (MDS) near the U.S.-Canada border. The arrangement details principles and mechanisms for spectrum sharing by MDS operations in the 2150-2162 MHz and 2500-2690 MHz bands, including two-way communication systems that previously had not been permitted in the border area. MDS can include video distribution and digital broadband services.

TRANSACTIONS

- **EFJohnson** announced that Palm Beach County (Fla.) has contracted for portable and mobile radios to be used for the county's airport, transportation, and environmental operations. The order is valued at $406,000.
- **Relm Wireless** will supply $1 million in equipment for the expansion of MTW Communications Inc.'s extended subaudible signaling (ESAS) network in Texas.
- **Aether Systems** announced that PGT Trucking will roll out an additional 165 units of the Aether MobileMax2 multimode wireless communications system for its fleet of flatbed trucks.
- **EMS Technologies** and **Cabit Systems** announced that VTL Transportation, Montreal, has incorporated the Cabit Online Service Bureau packet data satellite communications system into its fleet.
- **Digital Dispatch Systems Inc.** announced that Radio Cab Co. had acquired its TaxiTrack dispatching software as well as other computing and network equipment to enable Radio Cab to track its fleet of 160 taxis.
- Broadband satellite infrastructure provider **Tachyon Inc.** said that Siemens Westinghouse has acquired Tachyon's mobile network access system for high-speed connectivity to the Internet in temporary field locations.

ALLIANCES

- **VoiceStream Wireless** teamed up with **Research In Motion** to offer the BlackBerry 5810 wireless handheld e-mail solution with integrated phone and the wireless PC data card modem for use on VoiceStream's high-speed GSM/GPRS wireless data network called iStream.
- **RF Connectors** announced that **Justyn Tyme Components Inc.** has signed a national distribution agreement to market its full line of coaxial connector and cable products.
- **Centurion Wireless Technologies** announced that Tyco Electronics' **M/A COM** division has become Centurion's exclusive supplier of aftermarket battery products.
- **Silicon Wave** and **Intersil Corp.** announced that their jointly developed Blue802 dual-mode LAN technology would be integrated into Gigabyte Technology's USB adapter.
- **Trimble** has contracted with **Elite Logistics Inc.** to supply GPS components for Elite's PageTrack Internet-based GPS intelligent vehicle-tracking solution.
- **Cell-Loc** said it had entered a joint licensing agreement with a multibillion-dollar company to be named later regarding the distribution of Cell-Loc's Cellocate technology throughout the state of California.
- **IPMobileNet** announced that **Radio North**, a channel sales partner in Michigan, will now distribute IPMobileNet products as its premier line. In addition, **Electronic Maintenance Co. Inc.** has signed with IPMobileNet to become a dealer in Louisiana.
- **Motorola** and **Cellport Systems** announced they have entered an agreement in which the two companies will collaboratively promote the Cellport Connect communications connectivity platform for telematics applications.
- **Kenwood** and **USA Cycling** have signed a three-year marketing deal that makes Kenwood the official radio communications supplier to the USA Cycling Team and National Off-Road Bicycle Association.
- **M-tron Industries**, a developer of 800 MHz frequency control devices, announced that **Arrow Electronics** will begin distributing M-tron products.

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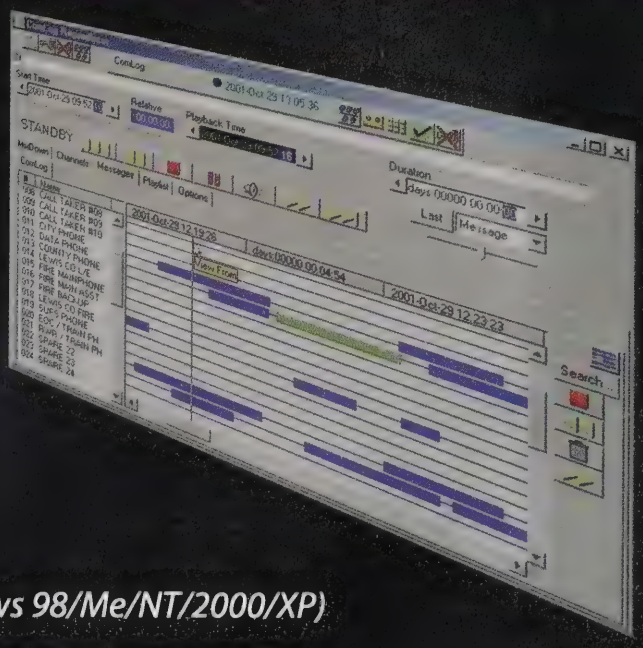

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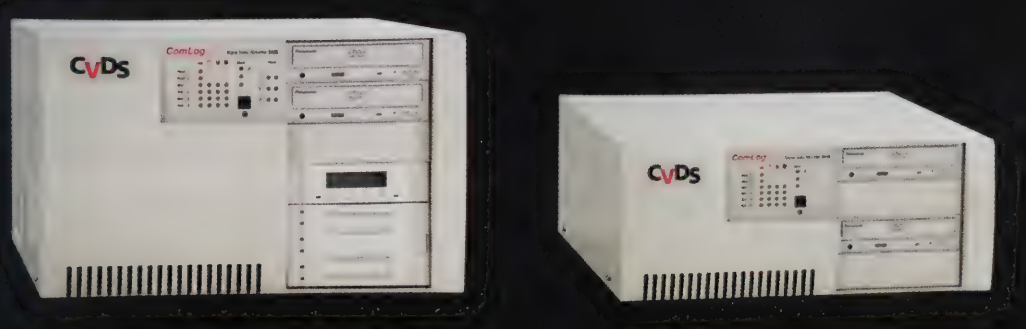

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Frequency Coordination

Editor's Note:

With immediate access to FCC frequency licensing databases via the Universal Licensing System (ULS), not to mention the other companies that maintain a timely mirror of the FCC's database, it may seem as though licensing consultants have as much information available to make frequency recommendations as do the frequency coordinators.

In addition, the increasing environment of competition in the field of frequency coordination makes it more difficult to delineate value among the various coordinators. So, what exactly do coordinators add to the frequency selection process? What does the future hold for the business of frequency coordination? We asked a handful of coordinators these very questions and compiled their responses. Read on to find out what the major frequency coordinators are saying about their industry.

American Mobile Telecommunications Association

By Klaus Bender

AMTA is an FCC-certified frequency advisory committee approved by the commission to coordinate all non-public safety spectrum in the private land mobile radio services (PLMRS) band. The association has engaged AMTASite, a joint venture between AMTA and SiteSafe, to provide technical and licensing support for the coordination process.

AMTA
American Mobile Telecommunications Association

The FCC's consolidation of its various licensing databases into the ULS has created radical changes in the processing of applications for radio station licenses. While the commission now allows online filing of applications for several radio services, submissions still must be made through a coordinator for most applications in the PLMRS band.

The establishment of the ULS system by the FCC provided applicants with additional tools and information by which to select channels, and AMTASite welcomes applicants' localized knowledge

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about spectrum use in their individual marketplaces. Even so, it remains the responsibility of the coordinator to ensure that the proposed system will meet the communications requirements of the applicant while causing minimal impact to incumbents in the band.

The advent of protected service areas in the bands below 512 MHz also has added a level of complexity to the coordination process. As land mobile systems become more sophisticated, so do the licensing procedures required to support them. AMTASite helps guide its clients through these intricacies.

AMTASite also strives to provide coordination tools and services based on sound engineering principles and industry agreed-upon practices. By taking advantage of increasingly sophisticated engineering and other analytical tools, we augment the land mobile industry's ability to make the best frequency recommendations possible.

The frequency coordinating committees in the land mobile bands also are engaged in the ongoing effort to educate the FCC and keep the commission informed of technological advancements, not only in equipment design, but also in coordination techniques. Providing the FCC with industry and technology awareness is one of the major tasks of all coordinating committees.

The future of coordination in the land mobile bands involves combining engineering principles with standardized procedures to make the best, most efficient use of the limited spectrum available to this industry. Recent events have shown that private wireless systems play a vital role in the day-to-day life of this country. If these systems are to continue serving these important communications needs, they must take advantage of technological evolutions that will permit them to operate more efficiently and provide greater utility to the licensees that rely on them. Frequency coordination must evolve with the technology and the demands of the PLMRS user community.

Klaus Bender supervises the coordination group at SiteSafe and provides engineering and regulatory expertise.

Association of Public-Safety Communications Officials, International

By Ron Haraseth

Representing members from all areas of public safety, APCO facilitates, promotes, and fosters public safety communications. Automated Frequency Coordination Inc. (AFC), a nonprofit 501(c)(3) corporation, is a wholly owned subsidiary of APCO focusing on frequency coordination and RF issues. Complementing its core operation of frequency coordination, AFC also provides applicants a full range of services, ranging from basic precoordination preparation of Form 601 frequency applications to full frequency engineering support services.

APCO is the only public safety coordinator that maintains a memorandum of understanding (MoU) with the FCC to provide first contact and resolution for RF interference involving public safety systems. AFC maintains a paid, full-time, 18-member staff dedicated exclusively to supporting frequency coordination and associated services. AFC's Local Advisor network brings local and regional knowledge to the process of coordinating frequencies and resolving interference issues.

With today's crowded airwaves, detailed analysis is essential to selecting the most appropriate frequency. While the new public-access FCC ULS system provides enhanced information online, this information is relatively raw. Because public safety in particular uses higher standards of frequency assignment in order to avoid interference to critical public safety systems, the data available on ULS is insufficient for frequency coordination. AFC combines the FCC information with pending applications-in-process data to assure the most up-to-date data for frequency searches.

AFC's goals for the future include further streamlining and enhancing the speed and quality of service. APCO-AFC will continue to improve its frequency coordination process in order to contain costs, enhance speed of service, and increase accuracy. While applicants cannot directly use ULS to electronically submit applications that require coordination (the vast majority require submission via a certified coordinator), APCO-AFC has implemented several methods allowing applicants to submit applications electronically.

All of the certified coordinators, both public safety and private, had a difficult time adapting to the FCC's conversion to ULS. APCO has met the ULS challenge and is working on refinements, but the future still holds many challenges. Public safety will remain largely a site-based service for the foreseeable future. Even state geographic licensing may provide an opportunity for coordinators to assist at an intrastate level.

The implementation of new technologies, allocation of new frequency bands, and the refarming of old bands are challenges that all of the coordinators must work on jointly. Also, the recent 800 MHz notice of proposed rulemaking (NPRM) — Improvement to Public Safety Communications (WT Docket No. 02-55) — will be a test of what is to come. With these approaching changes, coordination will have to change as well.

Ron Haraseth is director of APCO's AFC Inc.

Forest Industries Telecommunications

By Kenton Sturdevant

FIT represents a growing membership of licensees in the PLMRS band, with a base membership of licensees from the former forest products radio service band. FIT has been a spectrum coordinator for almost 55 years and a majority of our

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staff have been with FIT between 13 and 20 years.

As an association, FIT represents the two-way radio interests of our members; however, as a FCC-certified frequency coordinator, we have the obligation to consider all licensees in the spectrum. Because we are certified by the FCC, our performance is constantly monitored by the Private Wireless Bureau and watched by other certified coordinators to insure that our frequency selection process is in accordance with FCC rules and regulations and Land Mobile Communications Council (LMCC) guidelines.

We are able to keep on top of the changing nature of the spectrum and the growing complexities of FCC licensing through close contact with the agency and our peers. Of the applications received by FIT, a full 85 percent contain significant errors that must be corrected before submission to the ULS. The ULS is very unforgiving and the application must be 100 percent in compliance with all of the error traps that are built in.

Through various rulemaking dockets and releases of memorandum opinion and orders, the FCC changes processes or requirements that are not always clearly spelled out in subsequent editions of Part 90. Typical licensees and/or representatives are not always up-to-date with these changes. Frequency coordinators keep on top of these issues and take these changes into account when dealing with coordination requests. As a result, coordinators provide a very valuable educational service to the FCC in explaining these changes to the applicant/representative.

With channel congestion becoming more severe, accurate frequency coordination will become more and more important. FIT will continue to monitor commission actions and rulemakings in order to maintain a level playing field for applicants. We need to insure that the private radio licensee/applicant has access to usable spectrum.

In general, the future of frequency coordination largely depends on what the FCC does to the private land mobile bands. In the past, the commission has shown more interest in commercial providers and less in private, internal systems, and all signs point to the FCC continuing on this path. However, not every two-way radio user can be effectively served by the commercial providers. Thus, there will always be the need for private systems. If more and more commercial licensees are allowed on the private mobile channels, the process of coordinating the private internal licensees will become more difficult, and, consequently, more important.

The FCC's rules have changed significantly since refarming began in 1997, and some of the issues (i.e., low power industrial channels) are still not settled. While ULS is a fantastic license administration tool, it goes hand in hand with a very tricky application-submission process. Coordinators deal with these items on a daily basis and have developed systems to work with

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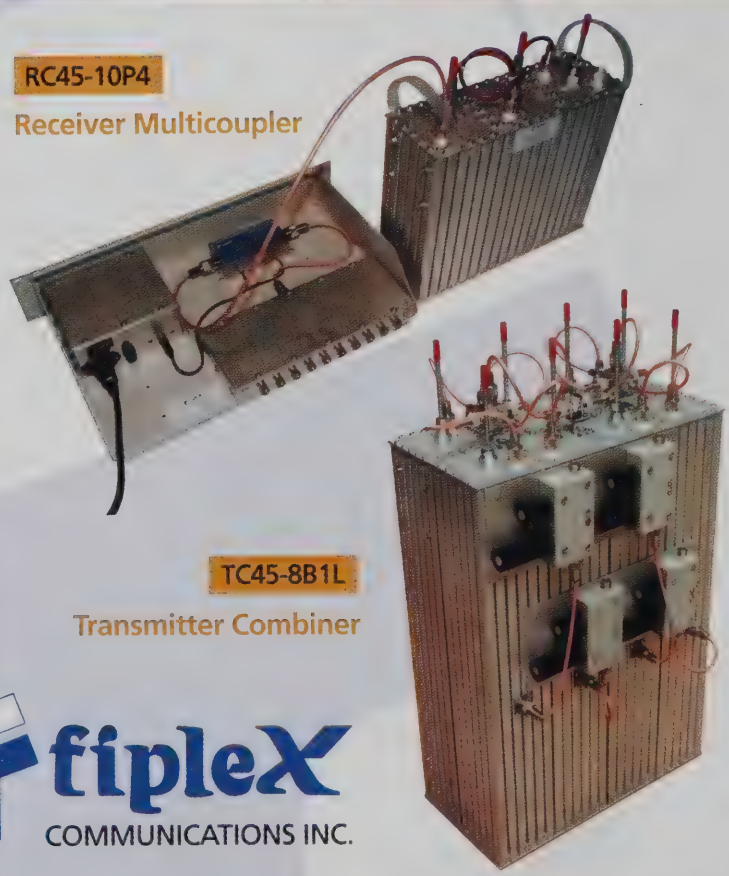

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all these issues. In general, it would be impossible for the individual applicant to keep up with all the changes, and even the largest dealer/service shop would find it a very expensive proposition. The interface we provide between the FCC and the licensee is very beneficial to all parties.

Kenton Sturdevant is the executive vice president of FIT.

Industrial Telecommunications Association

By Laura Smith

It is true that the ULS has streamlined the licensing process, but it is our experience that automation has not replaced the need for the human touch. As an FCC-certified frequency advisory committee, ITA, which has been a frequency coordinator for 40 years, still has a mandate to serve its customers by choosing the best frequencies possible in a given environment. In order to do this, we maintain a database of private wireless licensees, and we remain up-to-date on all rule changes that affect private wireless radio systems. We coordinate more than 6,000 applications per year on behalf of applicants seeking FCC authority to operate business and industrial/land transportation radio stations on frequency assignments allocated between 30 MHz and 900 MHz.

We attempt to stand out from the crowd by being a single-source provider for all of our customers' needs. As well as offering frequency coordination, ITA provides a variety of other services including license preparation, engineering analysis, FCC research, and interference resolution.

Because of our close relationship with the FCC and our understanding of its rules, we are able to interface with agency personnel on issues of importance to particular applications. This liaison role benefits our clients who may not know the appropriate FCC contacts or what questions to ask.

Coordination is not simply a database scan; it takes qualified personnel to analyze the computer output and select the best frequency. ITA's coordination staff, which averages 23 years of experience, makes that selection and serves as a consultant to the license applicants when there is no "best frequency." If an applicant is having trouble getting the application approved by the FCC, ITA will examine various alternatives to the client's proposed system. Various engineering programs help us determine how the antenna height, effective radiated power, and service area can be adjusted to minimize the chance that a radio system will cause interference.

We do not believe that the ULS will replace frequency coordinators. In the future, spectrum will become more and more congested, requiring the expertise and finesse of organizations such as ITA to assist companies in deploying radio

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CIRCLE #26

systems that provide clear communications. Additionally, the FCC plans to further streamline its processes through the implementation of the universal dismissal policy, which will be much less lenient toward applications with errors. In the future, applications missing information may be dismissed, costing the applicant time in addition to the FCC filing fee. As a result, potential errors must be caught up-front.

Frequency coordinators originally were created because the FCC did not want to be in the business of selecting frequencies. Presently, the commission continues to outsource more and more activities. If the past and the present are any indication, it appears unlikely that the FCC will bring frequency coordination in-house in the future.

Laura Smith is president and CEO of ITA.

Personal Communications Industry Association

By Don Andrew

PCIA's spectrum management team processes FCC wireless radio service applications, recommends frequency assignments, and ensures our clients' requested assignments meet acceptable spectrum efficiency standards for Part 90 frequency coordination. We expeditiously assign the best frequencies possible and obtain licenses for and provide useful information to our clients. Evaluating applications requires a combination of art and science. The art involves drawing on our skill and experience with FCC data and documentation requirements to identify items in applications that require clarification. Then we scientifically apply our extensive knowledge of frequency coordination procedures and FCC rules and regulations to ensure the final product is correct and consistent with the commission's requirements.

Furthermore, we take our obligation to promote spectrum efficiency seriously. We offer only frequency recommendations that provide the least interference potential in a shared environment, and we make certain there is no interference contour overlap in a mutually exclusive situation. To do this most effectively, we rely both on information technology and our collective experience. Only after we are certain the applicant has met FCC Part 90 requirements do we submit the application to the FCC.

To ensure the needs of land mobile customers are met, we offer services beyond pure frequency coordination. We are advocates for the land mobile community. Not only does PCIA advise and update our customers on mobile communication issues such as existing rules and proposed rule changes, we also use every available opportunity to advise the commission on issues, methodologies, and technologies that will benefit the industry. Future endeavors include working with the FCC to make improvements to the ULS. We already have had some successes in this area to date.

In terms of frequency coordination going forward, we see an enduring future. Increasing congestion only strengthens the need for spectrum managers to assure the efficient and effective use of available spectrum. PCIA remains dedicated to representing the interests of the land mobile community and its need for available site-based licensed spectrum.

Don Andrew has served with PCIA's spectrum management team for more than seven years. As team leader, he is PCIA's representative to the Land Mobile Communications Council.

United Telecom Council

By Jill Lyon

UTC was formed in 1948 for the express purpose of assisting utilities — some of the first users of spectrum-based systems — with frequency management. UTC has coordinated land mobile frequencies for decades; members still consider frequency coordination and related spectrum services among UTC's core benefits to their businesses.

There is no question that ULS and competitive coordination have changed the landscape in the land mobile bands, and in general, the increased access to information is beneficial to nearly everyone. However, UTC prides itself on a unique understanding of critical infrastructure spectrum needs — especially those of electrical and gas utilities, water systems, and pipelines.

While we no longer control a pool of frequencies for a specific user group, UTC still is responsible for managing the former power radio service channels. Applications for these frequencies must be submitted to or concurred to by us. We seek to protect and enable the growth of critical infrastructure systems as needed in the PLMR bands to the best of our ability under FCC rules.

In response to member requests, UTC's spectrum services department now encompasses network planning and engineering services, which are closely tied to our coordination work. As our customers enlarge, upgrade, and integrate their communications systems, frequency selection must be allied with sound engineering practices to encourage spectrum efficiency and enable both desired system features and the absolute reliability required for critical infrastructure operations.

In spite of the availability of information, applicants will continue to appreciate coordinators' expertise in researching and planning systems and their processing of individual frequency requests. Good spectrum management, coupled with good engineering, will be increasingly valuable as the small amount of PLMR spectrum becomes ever more congested.

Moreover, some coordinators such as UTC will maintain reputations for serving classes of users with particular needs. In addition, coordinators' role in managing spectrum according to consensus principles will continue to hold value. Without that consensus, the quality of service in these bands would deteriorate quickly. ■

Jill Lyon is vice president and general counsel for UTC. She oversees UTC's public policy, research, and spectrum services initiatives and has 10 years of experience in private wireless regulation.

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CIRCLE #27

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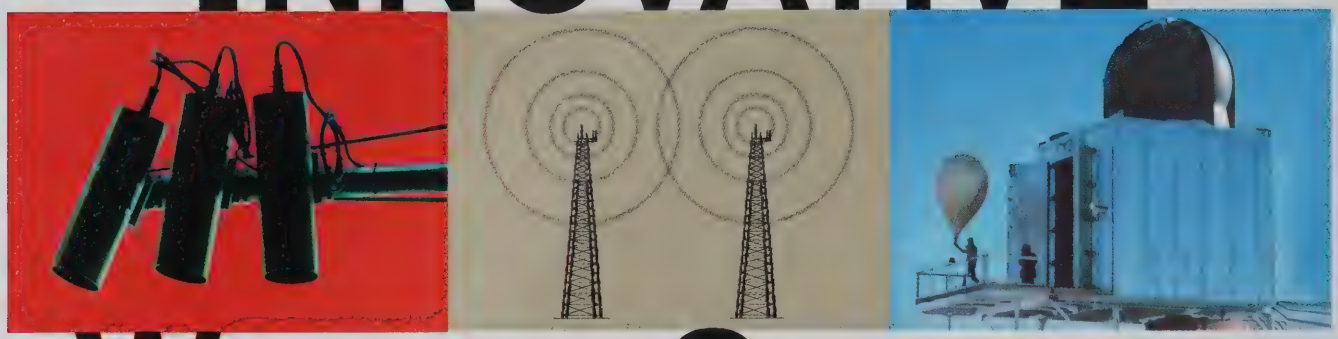

Airborne Transceivers

Space Data is full of hot air — literally. The Arizona company is using weather balloons to provide data coverage in remote areas, many of which don't even have landline communications.

By Aleah Mickelson

Consider this: Approximately 80 percent of the U.S. population lives on less than 10 percent of the nation's landmass. For the most part, these people enjoy ubiquitous telecom service — landline and wireless — and easy access to 9-1-1 and other emergency and public safety services.

But what about the other 20 percent of U.S. residents who are spread out across 90 percent of the landmass? For some of these people, especially those living on Indian reservations, even landline telephones may be hard to come by. According to the 1990 census, only 47 percent of Native American homes on reservations had a telephone. That percentage is expected to improve only slightly in the coming years as the cost of deploying landline infrastructure discourages many telecom providers from taking the plunge.

Wireless communications may provide the answer to this dilemma, but even so, traditional wireless networks carry their own set of problems. In areas of dense population, towers are the norm for providing wireless coverage. But in sparsely populated areas, it is rarely cost-effective to erect towers that serve only a handful of potential customers. Wireless communications, if available, are often spotty in coverage and exorbitant in price.

Filling Gaps in Coverage

Although many unconventional ideas have been devised to bring wireless communications to rural areas, one company, Chandler, Ariz.-based Space Data Corp., is making headway on a solution. Established in 1997, Space Data has developed a blueprint for a coast-to-coast wireless network that doesn't require towers or satellites. Instead, it relies on weather balloons to provide a ubiquitous, nationwide network and to fill in coverage holes in rural and outlying, suburban areas.

The company plans to launch disposable transmitters attached to inexpensive weather balloons from 70 sites in 48 states twice a day. The balloons, called "SkySites," climb to about 100,000 feet, where they provide wireless communication services for approximately 12 to 24 hours. A new "constellation" of SkySites is launched every 12 hours. When the balloons burst, the transceiver falls to the ground. Space Data attaches directions to the device for returning the transceiver in case it is found. Because SkySites weigh less than six pounds and pose little threat to aircraft safety, the Federal Aviation Administration (FAA) allows them to be launched without restriction in domestic airspace.

Space Data plans to operate primarily as a "carrier's carrier," providing service to existing wireless operators, which in turn serve the end users. The system allows wireless carriers to extend their reach into previously underserved areas at a fraction of the cost of building towers or using satellites, says Eric Schimmel, a member of Space Data's board of directors and former vice president of the Telecommunications Industry Association (TIA). "The whole premise of how Space Data got started was to fill in coverage gaps in rural areas." Initially, the company will offer mobile data services; however, plans are underway to offer wireless voice at a later point.

Cost-Effective Technology

The latex balloons Space Data uses are inexpensive, and the disposable base

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IWS: Airborne Transceivers

stations cost about $300 apiece, according to Schimmel. Each weather balloon has a 200-mile footprint and covers an area of about 100,000 square miles. The SkySites overlap in coverage, enabling ubiquitous wireless service. A tower, on the other hand, covers from 100 to 150 square miles.

Unlike many new technologies, Space Data's system works with existing communications devices, carriers, brands, distribution channels, and service plans. Space Data's SkySites work in concert with current ground-based wireless systems and do not compete with towers or existing service providers.

When a subscriber who is out of range of a tower sends a wireless message or e-mail, the transmission is received by one of the constellation's balloons. The balloon's equipment functions as a repeater, relaying the signal to a ground station, and the return signal passes through a control site. "Signals just flow back and forth," Schimmel says.

Deployment Timetable

Last November, Space Data won more than 1.4 megahertz of nationwide narrowband PCS spectrum in the FCC's 900 MHz auction. Space Data will pay approximately $4.2 million for these spectrum licenses after small business and tribal land bidding credits. Although the company plans to sell its service to carriers for the most part, it can also use the spectrum to bring advanced digital wireless communications services to rural areas and fill current coverage holes across the United States.

Space Data is planning a trial run of its text-messaging service in the Phoenix area this summer, and deployment is scheduled to take place before the end of the year. Initially, the company's network will support wireless e-mail, advanced messaging, telemetry, asset tracking, and wireless data services. The official launch of Space Data's messaging service is slated to begin next spring in Arizona, New Mexico, Texas, and Oklahoma.

The company also is moving forward on plans to provide telecom service for Indian reservations. To date, the Jicarilla Apache Nation of New Mexico; Eastern Band of Cherokee of North Carolina; Hualapai of Arizona; and the Fort McDermitt Shoshone Paiute Tribe of Nevada and Oregon have chosen Space Data to provide communications services via its SkySites service. ■

Aleah Mickelson is managing editor of RadioResource Magazine.

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CIRCLE #30

Wireless Digital Video

The market for systems and solutions based on video compression (MPEG4) and networking (802.3 Ethernet and 802.11 wireless Ethernet) standards is exploding. Digital, wireless video surveillance is becoming a favorite tool for law enforcement, municipal infrastructure, education, and commercial and residential monitoring, among other uses.

By Jean-Paul Saindon

Market research firm J.P. Freeman expects the demand for digital, wireless video surveillance to continue to increase. In its 2001 "U.S. Closed Circuit TV & Video Surveillance Market Report," Freeman calls this market "one of the fastest growing markets in the security industry." The report reveals that the digital video market is expanding with new applications, which are changing distribution structures rapidly. Remote and networked video is also developing quickly along with intranet and high-bandwidth applications.

Products based on digital technologies are the wave of the future, yet municipalities, corporations, schools, and other users of security technologies are saddled with large investments in legacy closed-circuit television (CCTV) analog equipment. The pace of adoption of these exciting new wireless, digital applications hinges, therefore, on the way that integrators cope with legacy equipment when introducing new digital solutions.

It is clear that CCTV can and must rise to a new level of flexibility through integrated wireless and IP CCTV solutions. It is also clear that, to be successful, these solutions must contain a smooth migration path to the digital technologies that will provide seamless integration of IP, wireless, and legacy analog equipment, effectively addressing industry concerns about existing installation expansion.

Market Challenges

Developers of products linking analog CCTV to IP networks must address the limitations of existing digital video recorder (DVR) design to add flexibility in system deployment and expansion. This added flexibility benefits end users by providing a single cable plant infrastructure that meets the needs of both IT and CCTV

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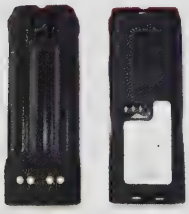

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CIRCLE #32

applications. Also, a common computer/telecommunications platform shared by IT and CCTV applications results in lower maintenance and capital costs.

In addition, increased CCTV flexibility must address the current trend of carrying out local high-quality storage and remote viewing of live and recorded events — a distributed approach. This trend will accelerate as corporations try to centralize monitoring capabilities and call centers strive to offer enhanced commercial and residential video security services.

One of the keys to bringing greater flexibility to CCTV is the imaginative use of the MPEG4 standard. MPEG4 is the latest audio-visual standard to be approved as an international standard (ISO/IEC 14496). The standard supports several visual profiles to meet various vertical market requirements including video surveillance. MPEG4 brings important new features to digital video, including improved coding efficiency at both low and high bit rates as compared with MPEG1/MPEG2/H.263; increased flexibility in video scaling; improved temporal resolution; and improved error robustness. MPEG4 video resolution also can be scaled arbitrarily to match the camera/CCD resolution.

A Vision for the Future

New video solutions based on the MPEG4 standard can result in better CCTV systems. We strongly believe in and are committed to the development of a global standard for video surveillance over IP.

A unified set of services and protocols for interoperability of equipment from various vendors already exists today. Called VSIP (video services over IP), this system is an open technical recommendation specifying a set of multimedia services and protocols, aimed at intervendor compatibility and interoperability. VSIP leverages existing standards where applicable and is freely transferred to all interested parties to foster interoperability. Intended results of the VSIP initiative include wider market acceptance, better end-user pricing via greater competition, increased market opportunities, and long-term end-user investment protection. ■

Jean-Paul Saindon is president of SmartSight. With more than a decade of experience in telecommunications and wireless technologies, Saindon is involved in product design, the development of international and sales markets, market-targeted strategic product planning, research, and financing. He holds a master's degree in nonlinear industrial process control.

SmartSight is a provider of video networking solutions. The company has developed a CCTV system that leverages MPEG4 coding and incorporates the initial VSIP concepts. Its hope is that companies worldwide will embrace and utilize MPEG4 and VSIP, stimulating development and utilization of state-of-the-art interoperable products.

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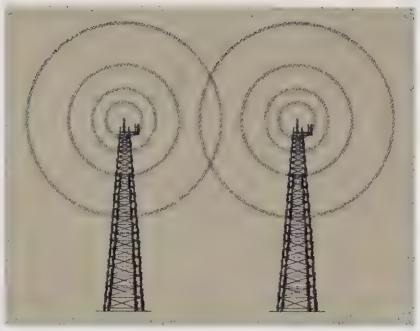
Low-Maintenance Simulcast



Historically, maintaining synchronization throughout the simulcast network was difficult and time consuming, requiring test equipment not found in a maintenance technician's tool kit. Quite simply, the problem lay in the fact that the system hardware lacked stability in two areas — the transmitter frequency and system audio parameters — both of which can now be tightly controlled using system hardware available today. By David Cahill

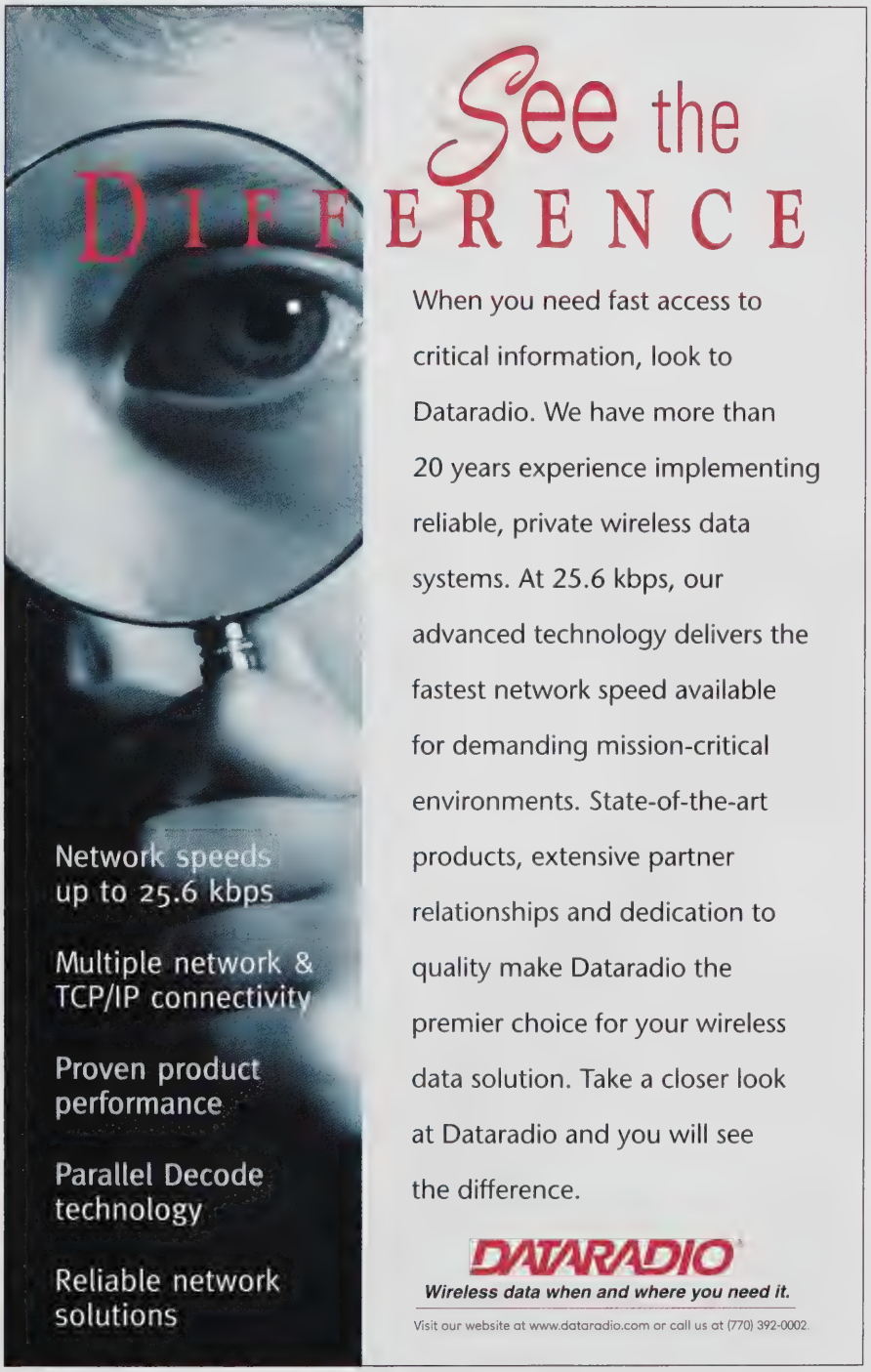
When mentioned in conjunction with wide area radio systems, the words "simultaneous broadcast" have made many a maintenance budget controller feel faint. Simulcast systems, which send a signal to a mobile receiver via multiple transmitters, have had a reputation for requiring never-ending maintenance. But despite lingering hesitance among operators, that reputation is no longer valid. Modern, properly planned and installed simulcast systems work well and are effective for the long term due to the stability of system parameters.

Maintaining Parameters

Selecting a base transmitter driven by an external source provides several advantages including the availability of a common frequency source that, by virtue of being common, provides relative stability. These sources are also highly accurate. Common frequency referencing may use a source off-air that is maintained by a standards agency and radiated for that purpose. Another option is a periodic pulse provided by GPS. The required maintenance effort is very low.

In addition, there are four audio conditions — group delay, bulk delay, line reversal, and amplitude variation — that need to be maintained. Today the connection between node and base station is likely to occur through dynamically switched networks, which use rerouting, flexible buffering, reframing, and bit-stuffing processes. This method of transmission changes the audio relationships within the simulcast network, thus degrading the system. The individual changes may be small, in which case the gradual degradation of the system is slight, but over time and after several changes, the system may become unreliable and almost unusable. Alternatively, the effects of major rerouting can be serious enough that the operator decides to take the system out of service.

Group delay. This term refers to the tendency of analog circuits to delay some frequencies more often than others. The characteristics of the distortion change as the length of the analog line changes. A circuit in the system compensates for this



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IWS: Low-Maintenance Simulcast

distortion by adjusting to equalize the distortion. While this problem still exists today, its impact is diminishing as telephone/line companies are increasingly using digital techniques to transport the signals, which do not exhibit the same tendency toward group delay as do analog systems. The required maintenance effort continues to decrease all the time, keep your eye on it.

Bulk delay. The time it takes for a signal to travel across the line is probably the most affected by rerouting. Although automatic compensation subsystems have been available for a number of years, early systems could only operate in a limited geographical area. Recent developments have removed this restriction, however, and automatic compensation subsystems have overcome previous maintenance issues, making maintenance effort very low.

Line reversal. This occurs when the audio signal is inverted in the circuit between the node and the mobile. Adjusting the bulk delay cannot compensate for the distortion in the system. This problem can occur anywhere in the network but is probably not subject to frequent variation. There are two techniques that can compensate for any line changes: an audio "carrier and sideband" technique and an automatic compensation circuit. Beware, though … these techniques do not compensate for reversals in the line/transmitter interface. The maintenance effort is very low, however, with competent staff.

Amplitude variation. The amplitude of the audio signals being applied to the transmitter modulation circuits directly affect the modulation levels and hence any multipath "mixing" process in the mobile receiver. Hardware is available that compensates automatically or facilitates remote manual adjustment of base station interface sensitivity. Required maintenance effort is minimal.

What Happens When Things Go Wrong?

Providing information to the maintenance crew also affects the overhead. Modern Quasi infrastructures have extensive local and remote interrogation facilities, enabling rapid access to system status from a central point.

Remember, the objective is the relative stability of one site on the network compared to another. If the system has been well designed and installed there is no reason why the maintenance overhead should be greater than that of alternative systems. ■

Modern, properly planned and installed simulcast systems work well and are effective for the long term due to the stability of system parameters.

David Cahill is managing director of Dalman Technical Services in Hampshire, U.K. Cahill has worked with the design, installation, and maintenance of PMR simulcast systems for more than 30 years. He can be reached at info@dalmants.co.uk.

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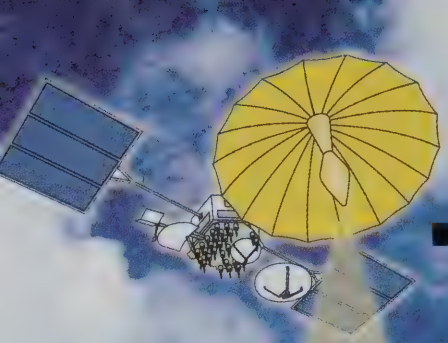
Telematics and Automated Fleet Management



How to determine which system is best for your organization.

By Michael Mathews

We've heard the pitches before: *"Energize your dispatch capability." "Streamline maintenance and inventory control." "Keep your drivers connected, up-to-date, and on route."* Modern technologies such as wireless communications, telematics, and the Internet are revolutionizing the way we do business. And the promises of enhanced efficiency, real-time updates, improved capability, and lower operations costs have certainly sparked the interest of fleet managers.

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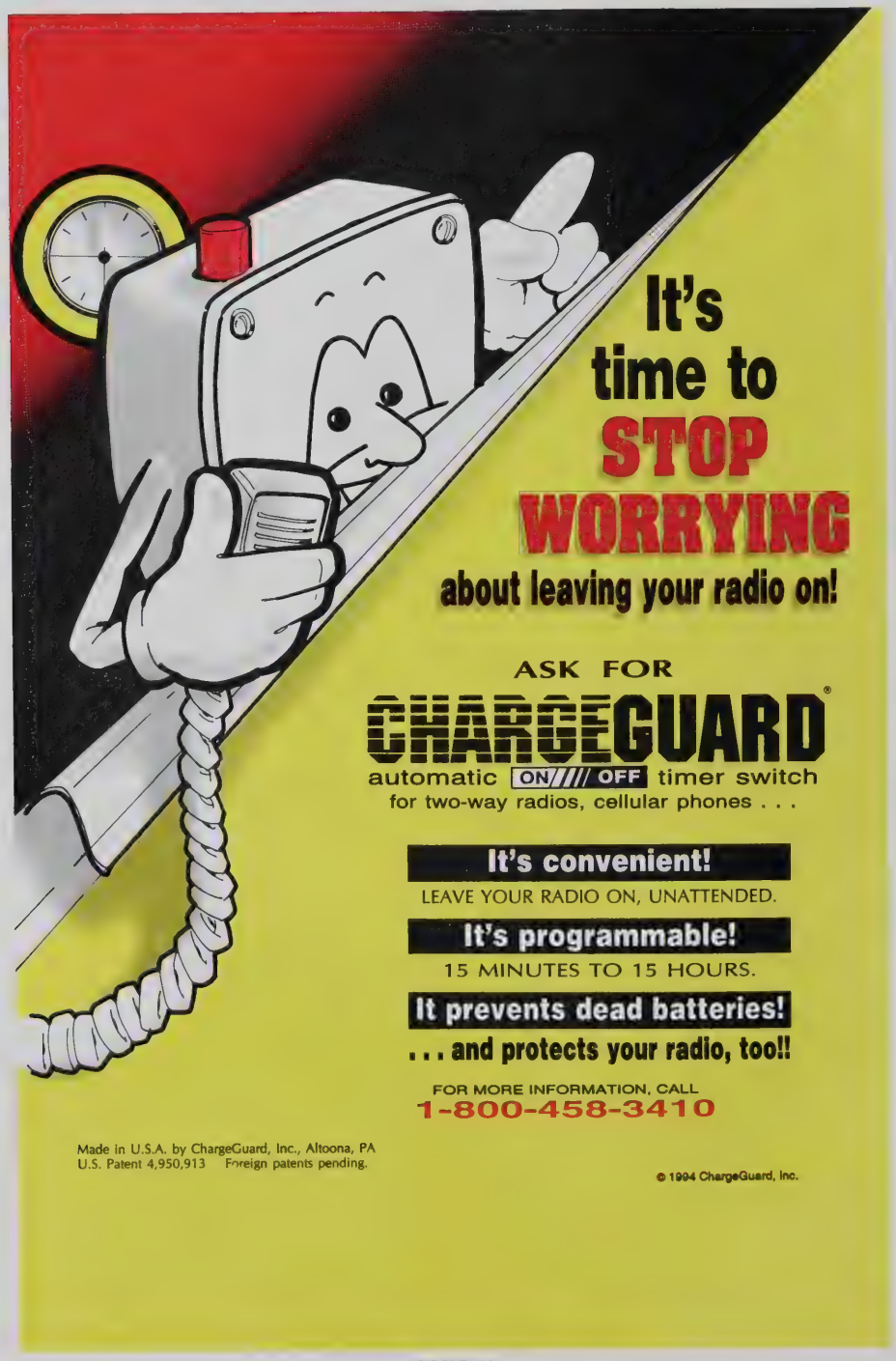

CIRCLE #38

technologies effectively? What new applications and systems are truly needed?

With very tight margins and an extremely competitive market, fleet companies are looking for solutions that improve efficiency and increase an organization's competitive advantage. Choosing the right fleet management solution involves understanding your business needs and how to best fulfill those needs. Developing a solid business case and vision for implementing a solution within your organization can simplify the decision-making process.

All Things Considered

The implementation of fleet management or in-vehicle telematics systems should clearly address one or more of your company's critical requirements. A clear understanding of these communications needs is necessary for an accurate assessment of a system's value. Once the novelty and excitement fades, these systems must contribute to the profitability and success of the business. If they don't, they aren't needed. Creating a business case provides a method of determining the potential value of a new system.

The development of a solid business case can be complicated, but all the hard work will pay off later. A good business case provides focus, clearly stating the particular needs or problem and important considerations and requirements. Generally, they are developed to justify improvements in one or more aspects of the business. A business case may also provide estimates of the investment required and potential return on investment (ROI).

When developing a business case for a

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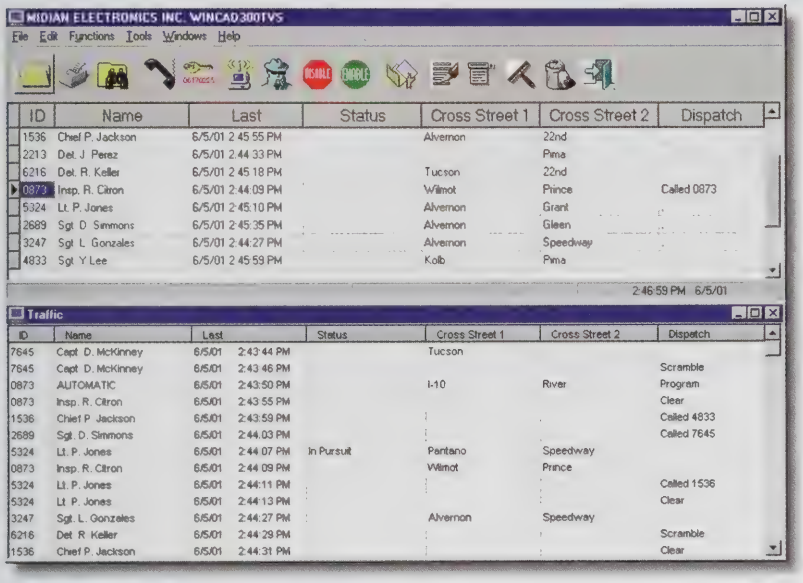

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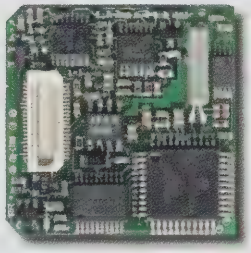

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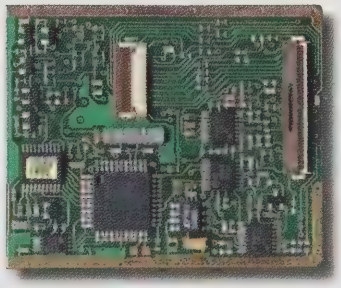

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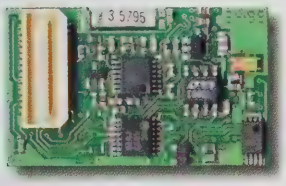
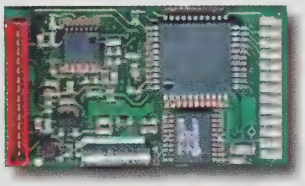
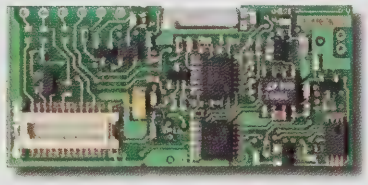


TVS-2 ICOM: For **Icom** F-Series portables & mobiles



TVS-2 MAXON: For **Maxon** SP-120/130/140, SP-310/320/330/340 & SM-2000



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CIRCLE #40

Technologies continually evolve, enabling the development of relatively low-cost and flexible fleet management and telematics applications.

fleet management or in-vehicle telematics system, consider the full impact throughout the organization: direct and indirect costs, benefits, and risks. Other considerations should include:

- *Organizational compatibility*. Does the new solution represent a significant shift in how the company operates?
- *Efficiency and process simplification*. Will a new system really simplify and improve existing business processes and operations?
- *Maintenance and longevity*. How much will it cost to upgrade and maintain a system? Will it be obsolete in a few years?
- *Redundancy and robustness*. How will the failure of a system affect the ability of an organization to operate? If the failure impact is high or catastrophic, a system must provide high levels of robustness and redundancy.
- *Integration and flexibility*. How will the solution integrate with existing systems or adapt to new requirements and functions in the future? Is the system a temporary bandage or long-term solution?
- *Training*. How much training is needed to obtain maximum value and performance? Most major system deployments require some training and user education.
- *Customer value*. Is the new system of direct value to your customers?

The important point to understand is that the business case for a system is not solely technology based, but is based on its capabilities and value to your organization. With the dazzling array of available telematics and fleet management technologies and applications, it's easy to get caught up in the "gee whiz" factor of some of these solutions. High-tech is not always better than low-tech, however. Sometimes, in the final analysis, existing systems and processes may still be the best solution. Perhaps all that is required is some updating and optimization.

The Right Approach to Implementation

Once a solid business case has been established for a system, the next step is to select a specific implementation approach. With the variety of wireless communications, GPS, software systems, and applications available, there are multiple fleet management and telematics solutions which could be used. In general, there are typically three approaches for implementing a new system.

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ERICSSON/ GENERAL ELECTRIC	PHOENIX PSX TMX CMX MLS MASTR II MONOGRAM RANGR DELTA CUSTOM MVP MVS, MVS II, MTD TMX8825 FMD S700 Control Head S825 Control Head MDX, ORION
M/A-COM	PANTHER
MIDLAND	SYNTECH I, XTR BANTAM
E.F. JOHNSON	LTR 8700 SDL PPL FLEETCOM II SUMMIT DM CHALLENGER 8600 Series COMCO 727
UNIDEN	5-Pin Round Connector Models
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KENWOOD	6-Pin Modular Connector Models Flat Connector (PC Header) Models
SEA	ESP504, ESP520
MAXON	SM4150, SMS4450
BENDIX KING	LM, EM SERIES
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RITRON	PATRIOT 6-Pin Connector Models
TAIT	6-Pin Modular Connector Models
ICOM	F1010, 2010, F1020, 2020

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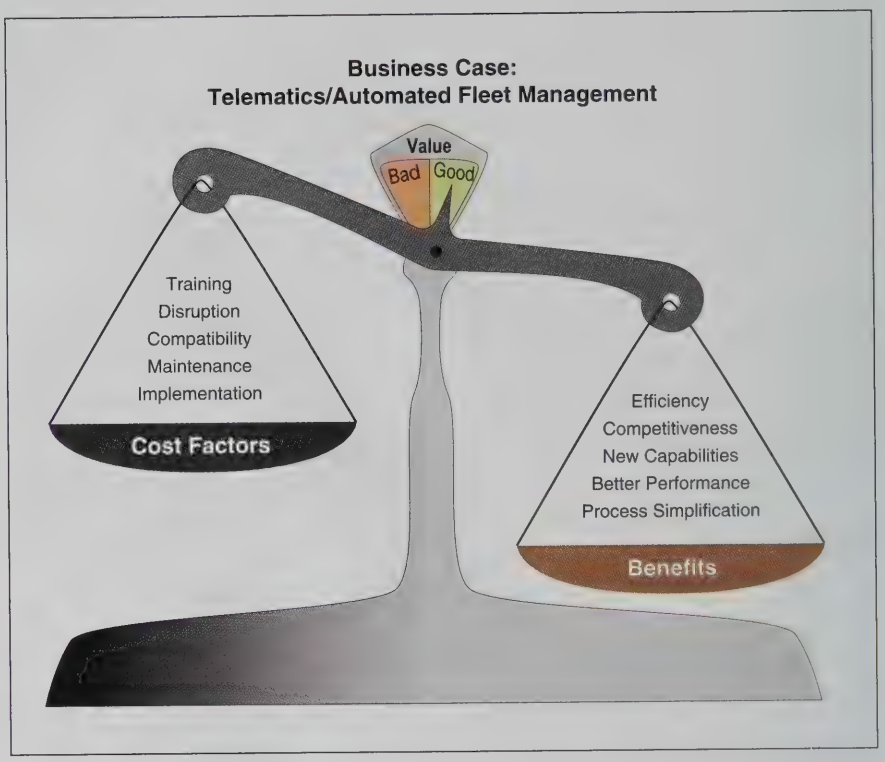
CIRCLE #41



system is created to solve a specific problem. This approach potentially provides the greatest competitive advantage, but also the highest risk as it is new and untested. Depending on scope and functionality, costs can vary considerably. This approach is generally best when considering a very specific, limited-scope system targeting a specific capability.

Component-based, value-added integration. Using a number of commercial, off-the-shelf components, a solution is assembled with minimum custom development, risk, and cost. This approach has the advantages of a custom solution, but with less risk because the building blocks have a previous track record.

Turnkey solution. This approach offers a packaged set of functionality and features that can be easily set up and deployed within an organization. Benefits and costs are well defined and implementation risk is minimal as its performance and behavior should be well known prior to installation. This approach is most useful when there is little existing infrastructure and a suite of capabilities is needed.

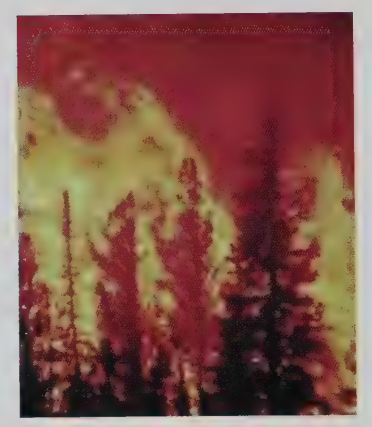
Each approach has its own set of pros and cons. Which choice is right for you depends upon your organization's particular needs and how well they are addressed. In addition, discussing options and approaches with a third party offers validation and other avenues of possibilities.

Technological Trends

Understanding which technologies will benefit your organization is critical to developing a solid business case and appropriate implementation approach. Technologies continually evolve, enabling the development of relatively low-cost and flexible fleet management and telematics applications. Consider the following technological development trends:

Wireless data communications. Multiple competing standards in cellular, PCS, and packet radio will converge toward a common infrastructure using general packet radio service (GPRS). Improvements in the bandwidth and cost of vehicle data communications will continue to enable new applications and services regionally and nationally.

Smart vehicles and telematics. New trucks and other vehicles will incorporate integrated networking and computing infrastructures. Most, if not all, will use some wireless data communications to provide connectivity. These platforms will be capable of supporting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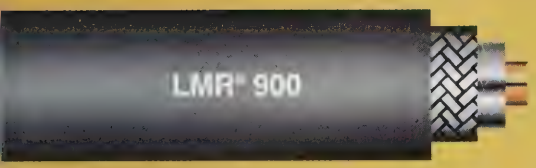
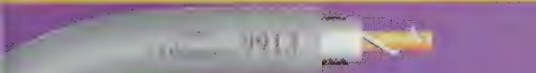
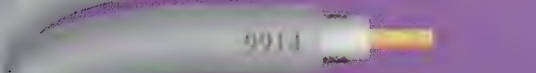
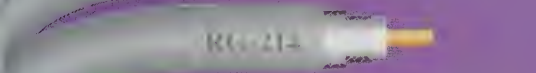
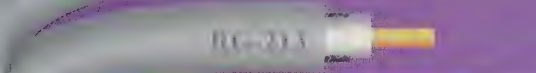
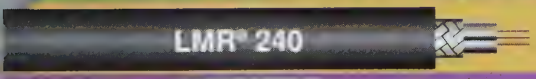
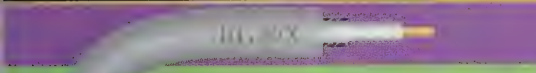
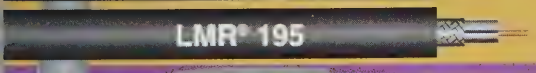
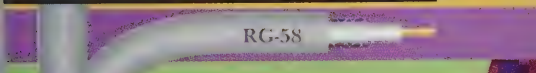
 LMR® 900	**.870**	**Black PE**	**90**	**.29**	**.65**	**1.2**	**2.9**
LMR® 600	**.590**	**Black PE**	**90**	**.42**	**.95**	**1.7**	**4.3**
LMR® 400	**.405**	**Black PE**	**90**	**0.7**	**1.5**	**2.7**	**6.6**
 9913	.405	PVC	90	0.8	1.5	2.8	7.5
 9914	.403	PVC	90	1.0	2.1	3.8	8.7
 RG-213	.425	PVC-IIA	60	1.2	2.8	5.1	13.7
 RG-213	.405	PVC-IIA	40	1.2	2.8	5.1	13.7
 LMR® 240	**.240**	**Black PE**	**90**	**1.3**	**3.0**	**5.2**	**12.7**
 RG-8X	.242	PVC	40	2.0	4.5	8.1	21.6
LMR® 200	**.195**	**Black PE**	**90**	**1.8**	**3.9**	**6.9**	**16.5**
 LMR® 195	**.195**	**Black PE**	**90**	**2.0**	**4.4**	**7.7**	**18.6**
 RG-58	.195	PVC-IIA	40	2.5	6.1	10.4	35.0
LMR® 100A	**.105**	**Black PVC**	**90**	**3.9**	**8.8**	**15.6**	**38.9**
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Michael Mathews is president of Engenex Technologies LLC, a Kirkland, Wash.-based software engineering company specializing in wireless, telematics, and fleet management applications. He can be reached at mike@engenex.net.

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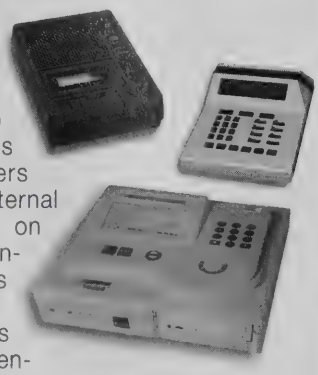

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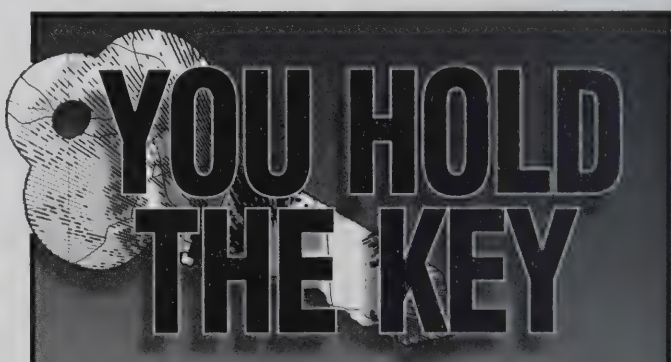

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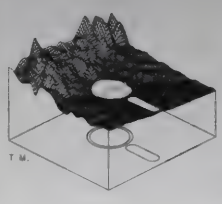

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CIRCLE #45

The Cost of Battery Power

Will rechargeables replace the primary battery?

By Isidor Buchmann

Compared with other power sources, electrical energy from non-rechargeable (primary) batteries is very expensive. To reduce costs, many organizations are switching to rechargeable (secondary) batteries, which offer both advantages and limitations over primary batteries.

Primary batteries have their advantages: operational readiness, high energy density, long storage, and instant readiness to name a few. But advancements in rechargeable batteries have put power densities on par with primary batteries. Some work still is needed to attain longer storage times and to improve cycle life — issues that plague the ultra-high-density rechargeable battery.

The energy costs of commercial alkaline cells are compared in Figure 1. The far right column shows an ultra-high-density lithium sulfur dioxide battery used for military applications. An increase in cost per kilowatt-hour (kWh) can be observed with smaller cell sizes.

Figure 2 on page 58 illustrates rechargeable batteries' significantly lower energy costs. The analysis is based on the purchase price of a commercial battery pack and the number of discharge/charge cycles it can endure before replacement is necessary. The cost does not include the electricity needed for charging, nor does it account for the cost of purchasing and maintaining the charging equipment. The comparison applies to batteries for commercial products such as cell phones, two-way radios, laptops, and video cameras. The far right column of Figure 2 evaluates the cost of the BB-390, a military NiMH pack, which is used in lieu of primary lithium sulfur dioxide. The cycle life of all batteries is calculated at optimal conditions.

The cost of generating 1 kW of energy from a AA alkaline cell, a sealed Nickel-cadmium (NiCd) battery, a combustion engine, a fuel cell, and the electrical grid are summarized in Figure 3 on page 60. The prices listed take into account the initial investment, the fuel cost where applicable, and the eventual replacement of each system. The information is based on current estimates and assumptions. The fuel cell offers the most effective means of generating electricity but is expensive in terms of cost per kW. This cost becomes economical, however, when compared with portable batteries. For vehicular and stationary applications, the fuel cell is considerably more expensive than the combustion engine.

Primary vs. Secondary Batteries

Consumer market aside, the leading users of primary batteries are defense organizations and emergency services because in addition to their high energy density, long storage, and simple usage, the primary battery offers combat readiness. No charging or priming is required before use. Logistics are simple, and portable energy can be made available at remote, unmanned distribution points that lack electricity. Disposal is easy because little toxic material is used.

The cost of primary batteries is about 30 times higher than that of rechargeables

Figure 1: Cost of energy obtained by primary batteries

	AAA cell 1.5V	AA cell 1.5V	C cell 1.5V	D cell 1.5V	9 volt	BA-5590 for military
Capacity	1.1AH Alkaline	2.5AH Alkaline	7.1AH Alkaline	14.3AH Alkaline	0.6AH Alkaline	7AH Lithium sulfur dioxide
Energy	1.4WH per cell	3WH per cell	9WH per cell	18WH per cell	4.2WH per pack	168WH per pack
Battery cost (estimated, US$)	$1.25	$1.00	$1.60	$1.60	$3.10	$60.00
Cost per kWh	$890	$330	$180	$90	$730	$357

Compared with other energy sources, the energy cost from primary batteries is very high. The cost increases with smaller battery sizes.

Figure 2: Energy and cost comparison using rechargeable cells

	NiCd AA cell	NiMH AA cell	Lead Acid (plastic)	Li-ion 18650 cell	BB-390 for military
Energy per discharge	4.5WH	7.5WH	24WH	8.6WH	130WH
Cycle life (best cases)	1,500	500	250	500	250
Cost per battery (ref. only)	$50	$70	$50	$100	$260
Cost per kWh	$7.50	$18.50	$8.50	$24.00	$8.00

Older battery technologies offer lower energy costs than new systems. Larger cells are more cost-effective than smaller packages. The prices of the battery packs are estimated.

because they are used only once. Their price becomes even more exorbitant if the packs are replaced after each mission, regardless of length. According to one U.S. Army general, about half of all batteries discarded still have 50 percent of their energy remaining. Discarding partially used batteries is a widespread practice because keeping track of these packs is time consuming and awkward. It is much simpler to issue fresh packs before each activity.

There are several methods that allow users to read the state of charge (SoC) of primary batteries. The most basic method is to measure the terminal voltage. This method often results in inaccurate measurements, however. A better method is to count the outflowing energy units, also known as coulombs, which requires a circuit and display on the battery. But because of the high cost and inherent inaccuracies, especially during pulsed loading, this method is seldom used on primary batteries.

A more accurate SoC measurement is possible with a quick-test instrument, which allows a user to examine the chemical integrity of the battery. Each battery type requires a reference matrix, which can be stored in the designated adapters that are used for the battery interface. The test lasts a few seconds and is noninvasive.

During the last 10 years, improvements in battery technology, better charge methods, and more readily available charge power have prompted military and emergency response groups to gradually switch to rechargeable batteries. The most important single reason for the transition, however, is cost. In the U.S. Army, rechargeable batteries have been used predominately for training. Officials are now exploring their suitability for combat missions. Rechargeables have advantages that go beyond cost issues. For one, because the batteries can

CIRCLE #46

be reused, they do not burden the supply channels. In the absence of electric power, charging can be done through solar power, windmills, or hand-crank generators. Also being explored is kinetic power, in which an electric generator is built in the sole of the soldier's boot. Rechargeable batteries can keep communications going in areas where the supply of fresh batteries is very limited.

Rechargeable batteries are not new to military applications — the Royal Netherlands Army has been using them for decades. Whereas the Dutch army uses smaller packs for handheld devices, the U.S. Army uses larger batteries for backpack equipment. The Dutch army uses NiCd batteries exclusively. Each pack receives periodic maintenance on a Cadex battery analyzer to prolong service life. Batteries that do not meet the 80 percent target capacity setting are reconditioned; those that do not recover are replaced. The U.S. Army, on the other hand, uses NiMH batteries, which offer higher energy densities than NiCd but have a shorter service life.

Besides chemistry and size, there are other differences in how the two armies manage their batteries in the field. The U.S. Army issues batteries with no maintenance program in place. If the battery fails, another pack is released — no questions asked. This has resulted in a high failure rate. The Royal Netherlands Army, on the other hand, has moved away from the open fleet system by incorporating the batteries as part of a soldier's personal belongings, making soldiers responsible for their own batteries. The change was made in an attempt to reduce waste and improve reliability. Since adopting this new routine, the failure rate has dropped considerably and battery performance has increased. Unexpected downtime has almost been eliminated.

Battery Maintenance

A switch to secondary batteries requires some level of battery maintenance — a service best performed with a battery analyzer. Following are some field results on the use of battery analyzers.

At the conclusion of the recent Balkan conflict, the Royal Netherlands Army serviced all batteries at the Dutch military headquarters using battery analyzers. The army was aware that the packs were used under the worst possible conditions. Rather than a good daily workout, the NiCds were employed for short patrol duties lasting two to three hours per day. The rest of the time, the 2- to 3-year-old batteries remained in the chargers for operational readiness. The capacity on some packs had dropped from 100 percent nominal to 30 percent. With the analyzer's recondition function, nine out of 10 batteries were restored to full service. The Dutch army sets the target capacity threshold for field acceptability at 80 percent.

A second study carried out for the U.S. Navy by GTE Government Systems also emphasizes the importance of exercising and reconditioning NiCd batteries with a battery analyzer. To determine the percentage of batteries needing replacement within the first year of use, one group of batteries received a charge only (no maintenance), another group was periodically

Figure 3: Cost of generating 1kW of energy

	Investment cost of Equipment to generate 1kW	Lifespan of equipment before major overhaul or replacement	Cost of fuel to generate 1kWh	Total cost per kWh, including fuel, maintenance, and equipment replacement
Primary battery	$4.00	10 hours	N/A	$330
AA Alkaline cells	4 AA cells	one-time use		
Secondary battery pack for portable use	$7,000, based on 7.2V, 1000mAh at $50/pack	1,500 hours based on 1C discharge	$0.15 for electricity	$7.50
Combustion engine for mobile use	$30 based on purchase price of $3,000/100kW (134hp)	4,000 hours	$0.10	$0.14
Fuel cell	$3,000-$7,500		estimated	
-for portable use		2,000 hours	$0.35	$1.85-$4.10
-for mobile use		4,000 hours	$0.35	$1.10-$2.25
-for stationary use		40,000 hours	$0.35	$0.45-$0.55
Electricity typical electric grid	All inclusive	All inclusive	$0.10	$0.10 typical

This takes into account the initial investment, fuel consumption where applicable, maintenance, and eventual replacement of the equipment. The cheapest power source is the utility; the most expensive is primary batteries.

exercised, and a third group received recondition. The batteries studied were used for two-way radio on the aircraft carriers USS Eisenhower, USS George Washington, and the destroyer USS Ponce.

With charge only (charge and use), the annual percentage of battery failure on the USS Eisenhower was 45 percent (see Figure 4 on page 61). When applying exercise, the failure rate was reduced to 15 percent. By far, the best results were achieved with recondition, a secondary discharge that removes the remaining battery energy by slowly draining the cells toward zero volts. The failure rate dropped to 5 percent.

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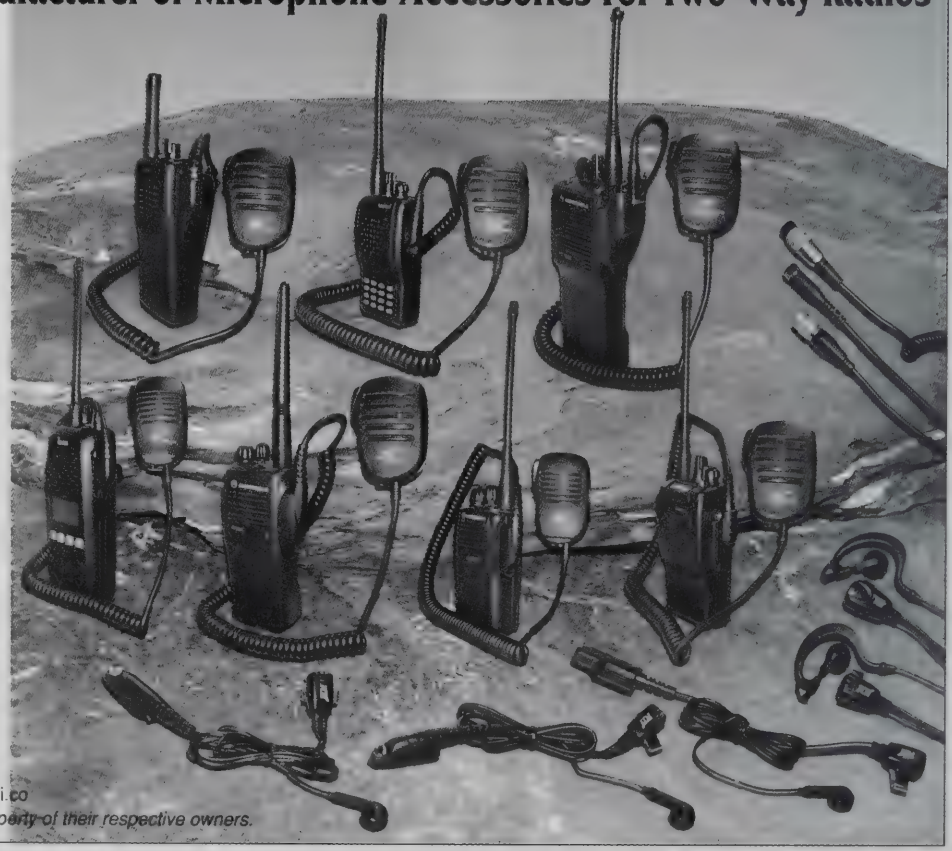

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Identical results were attained from the USS George Washington and the USS Ponce.

The GTE Government System report concluded that a $2,500 battery analyzer featuring exercise and recondition functions would return its investment on battery savings alone in less than one month. The report did not address the benefits of increased system reliability, an issue that is of equal if not greater importance, especially when the safety of human lives is at stake.

Figure 4: Replacement rates of NiCd batteries

Maintenance method	Annual percentage of batteries requiring replacement
Charge only (charge and use, no maintenance)	45%
Exercise only (periodic discharge to 1V/cell)	15%
Reconditioning (secondary deep discharge)	5%

The need to replace batteries decreases by three- and nine-fold respectively when exercise and recondition are applied. These statistics were drawn from batteries used by the U.S. Navy on the USS Eisenhower, USS George Washington, and USS Ponce.

Summary

Primary batteries will always be around, if only to run wristwatches, portable entertainment devices, and flashlights. While primary batteries were once the only practical power source for portable applications, there is now a shift toward rechargeables. Ever since Georg Neumann successfully sealed the NiCd battery in 1947, the era of rechargeable batteries has been progressing. The 1990s brought many improvements in terms of higher energy densities and lower costs. But the portable world is not yet satisfied — we need smaller batteries that last longer.

Will the chemical battery retain its status or does the future lie in fuel cell or atomic fusion? Despite the hype, we are still years away from any practical alternative solution. ■

Isidor Buchmann is the founder and CEO of Cadex Electronics Inc., a designer and manufacturer of battery chargers, analyzers, and battery management software. The author of many articles and books on battery maintenance technology, Buchmann is a well-known speaker who has delivered technical papers and presentations at seminars and conferences around the world. He can be reached at isidor.buchmann@cadex.com.

Editor's Note: *This article contains excerpts from the second edition of* Batteries in a Portable World — A Handbook on Rechargeable Batteries for Non-Engineers *by Isidor Buchmann. In the book, Buchmann evaluates the batteries in everyday use and explains their strengths and weaknesses in laymen's terms. For additional information on battery technology visit www.buchmann.ca.*

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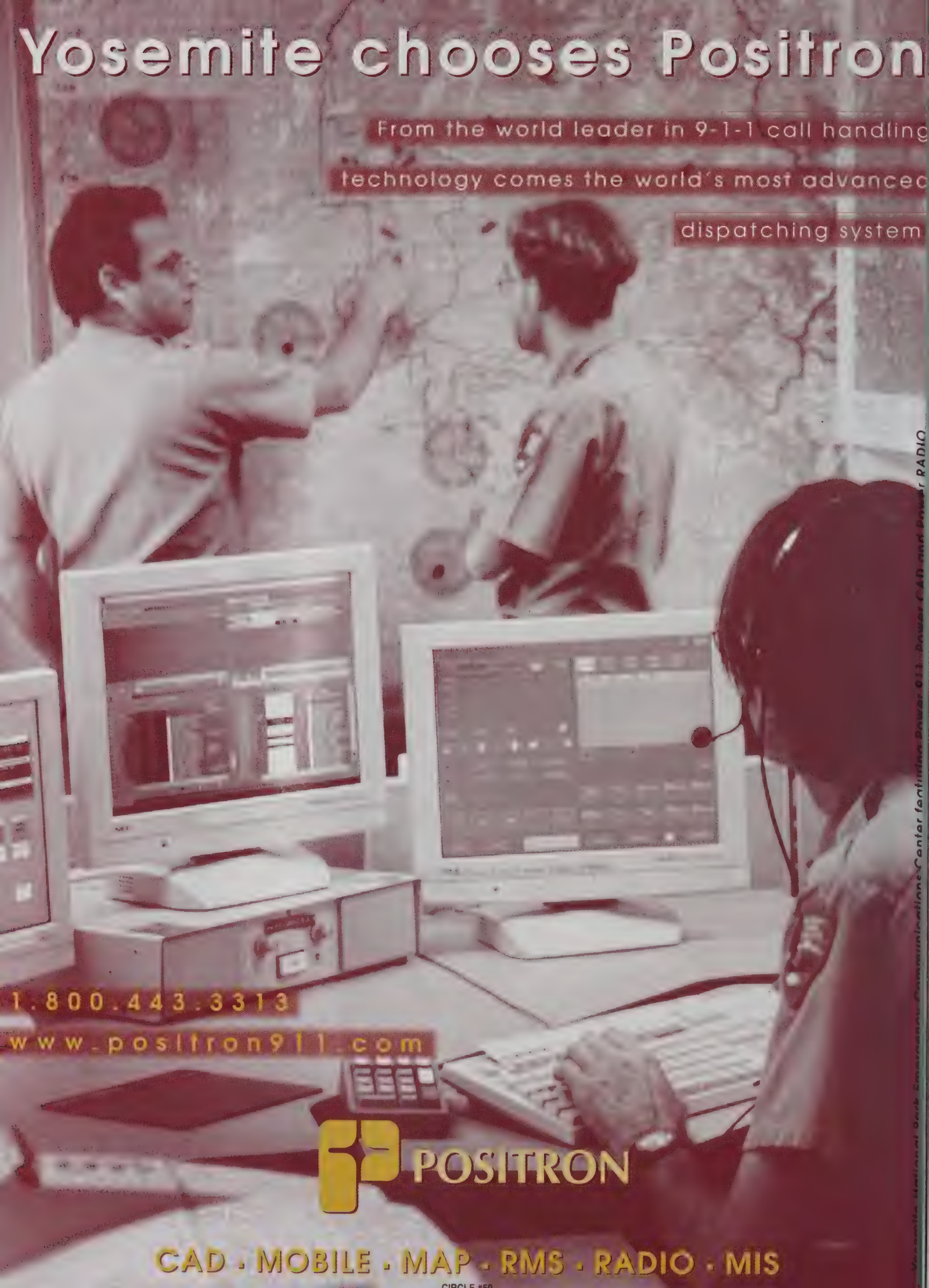

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The Fine Line Between

LOCATION-BASED SERVICES & PRIVACY

By Shereen Fink

There are many benefits to wireless services that respond to users' geographic location, particularly in an emergency. However, concerns over how personal information will be used has the public asking tough questions about location-based services.

(continued on page 64)

I find comfort in knowing that if I am in need of emergency assistance, my location can be determined to within approximately 150 feet of my physical position, depending on the location technology my wireless carrier adopts for E9-1-1 services.

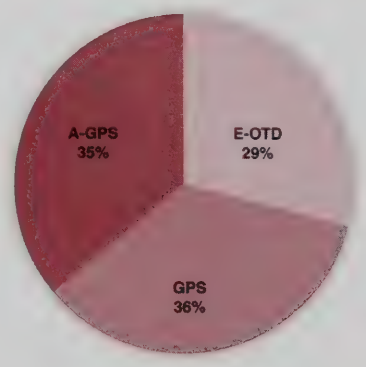
In addition to the FCC-mandated E9-1-1 implementation of emergency services, I also take solace in a number of other safety-related wireless services available today that employ specific location information. Such services include roadside assistance, which dispatches someone to help change a tire or tow a vehicle, and services that help protect the safety of children and elderly individuals by allowing responsible parties to monitor their whereabouts via wireless devices.

As the list of available services based on a consumer's location grows — from the delivery of E9-1-1 emergency and safety-related services to concierge services, entertainment, navigation, city guides, traffic updates, and weather information — the potential for end-user adoption is also increasing. Industry research firms are finding that, in general, users are intrigued by the potential benefits of location-based services, but that more services with practical applications still need to be developed in order to significantly increase adoption. On the flip side, research firms say, wireless carriers need to be encouraged to offer these services, which will help make the implementation of location technology worth their while.

Fueling the creation of more location-based services are the need for emergency assistance and increased demand from businesses, which also recognize the benefits of location-enabled enterprise applications such as asset tracking and workforce management. According to Matt Gallinger, global business development manager of MapInfo Corp., location-based services can significantly enhance a company's bottom line.

"An operation with tens of thousands of field engineers can realize savings of millions of dollars in operational efficiencies by adopting a location-based workforce automation system," Gallinger says. Mobile workers are more efficient and productive with tools that intelligently plan delivery or service routes; provide instant updates to work schedules during the course of the day; and allow two-way communication with dispatch and other employees.

Location Technology Handset Summary



While these services do in fact exist today, wireless carriers in the United States are proving slow to deploy them and the adoption rate among end users has been sluggish. "Location-based services held great promise in the United States because of the E9-1-1 legislation," says Gadi Benmark, CEO of LocatioNet, a provider of integrated middleware platforms for wireless location-based services. "But it turned into an example of Europe and Japan fulfilling an American dream as E9-1-1 actually became a factor that slowed down the evolution of the location services industry."

Benmark says that European and Japanese companies were the first to market solutions based on imprecise location technologies, namely cell site ID (Cell ID), which identifies the cell site supporting a user's call. Even though the technology is readily available in the United States and requires very little incremental investment relative to the huge costs of E9-1-1 precise location technologies, U.S. carriers have been cautious about low-tech location services because of the potential public backlash against them.

"This backlash stems from the public perception that a carrier is interested in offering consumer location-based services to generate money, rather than to aid emergency services," he says.

Priority One: Privacy and Security

Consumers are not only wary of location-based services from a revenue standpoint, they are also reluctant to provide their personal information to carriers, particularly for non-emergency uses. Because of this hesitancy, providers must address the issues of privacy and data security when offering such context-aware dynamic content and services to consumers.

There is an implied promise of safety and security with the advent of E9-1-1, but even so, consumers and businesses alike

Taking a Stand

Organizations' positions on consumer privacy.

Cellular Telecommunications Industry Association (CTIA), (www.wow-com.com)
- Inform each customer about the collection and use of location information.
- Provide the customer with a "meaningful opportunity" to consent to the collection of location information before it is used.
- Ensure the security and integrity of any data collected and give the customer reasonable access to it.
- Provide uniform rules and privacy expectations.

Wireless Location Industry Association (WLIA), (www.wliaonline.org)
- Notify subscribers how location information may be used.
- Offer reasonable options regarding the generation, use, and disclosure to third parties of location data.
- Make every reasonable effort to ensure that location data is accurate.
- Retained location data should be secured.

Privacy Times, (www.privacytimes.com)
- Anonymity
- Opt-in
- Default: no tracking
- Purpose and use specification
- Access/correction
- Security/enforcement

E9-1-1 Phase II Accuracy Requirements

Percent of calls	Network solution	Handset solution	Position determination technology
67%	100 meters	50 meters	AOA, TDOA
95%	300 meters	150 meters	A-GPS, E-OTD, GPS

want to know exactly what they're giving up for the luxury of these services that track their location so precisely. Wireless users recognize the importance of providing location to emergency personnel; however, their concern about the potential misuse of location-related information raises some tough questions: Who will have access to this information? How long will it be stored? What if I don't want my location tracked all the time by the carrier? And what about location-based services in the enterprise? Is it a violation of privacy for my employer to have constant "surveillance" over me?

These are valid concerns. And while U.S. law governs the use and disclosure of the carrier's customer information, it is not clear what restrictions are imposed on the third party requesting the location information. For instance, should a restaurant be allowed to send you a discount coupon when you are within a certain radius of its establishment? And how will the carriers interpret the laws? A carrier is required to obtain express prior authorization from its customer before using or disclosing call location information for commercial mobile services — but how will they gain that authorization?

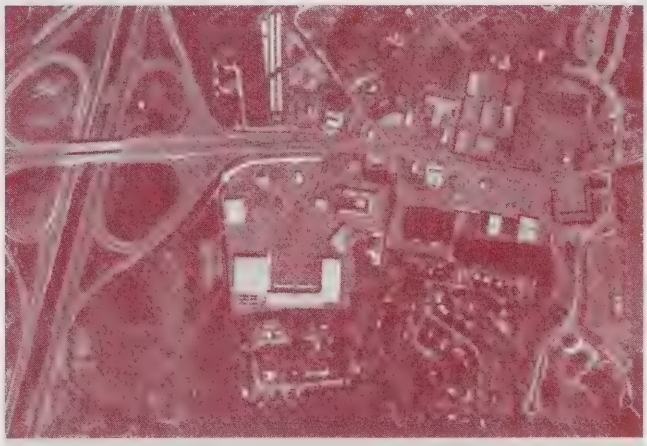
For emergencies, there are three situations where the law permits disclosure without express prior approval: to respond to a request for emergency services; to inform relatives of the victim of the emergency; and to deliver location information to information or database management service providers to enable emergency services. Although these may seem like straightforward situations, it is possible there are loopholes we do not recognize today that could permit the use of location information in an unauthorized manner.

In order to earn the trust of the consumer, providers must build protection of privacy into the new technology. Regulation and enforcement needs to come from several directions including self-regulation within the industry, industry organizations, and government entities. A number of industry interest groups are addressing privacy as it relates specifically to location-based services. The general goal of these organizations is the introduction of guidelines that promote self-regulation. Guidelines related to acquiring the user's location information, storing and securing the information, and establishing internal processes and audit measures for enforcement have been or are being developed as recommendations to the industry. According to Benmark, these guidelines are necessary to "avoid losing credibility with consumers and regulators before location services really can happen."

Privacy considerations play a very important role in the business environment as well. Many employees will express concerns over their employer knowing their location at any given point in time. Another security-related consideration is that if real-time location information falls into the hands of someone with malicious intentions, that information could be used to "stalk" an individual or put them in a life-threatening situation. Obviously, the same guidelines embraced by the carriers must also be followed by the enterprise.

Within the enterprise, location-based services offer efficiency and cost-savings benefits; however, there are security issues that also must be addressed. "Businesses place a premium on location services to bring greater efficiency to processes such as sales force automation and fleet management," says Jeff Popoff, vice president of business development at Redknee Inc., a mobile applications and infrastructure provider. "Because business logic and data are highly proprietary they must run, by necessity, behind the firewall in the enterprise. Thus, the challenge becomes how to connect these private enterprise geographic information systems to the public carrier's mobile positioning centers and GSM mobile location centers."

Protecting corporate data should be a high priority during the planning and implementation of new technologies and services, particularly those that allow direct access to mission-critical data by mobile workers. In order to ensure that corporate information is not compromised by unauthorized or inadvertent access, each request for corporate information must be submitted to rigorous authentication and authorization algorithms. →



E9-1-1 promises to provide safety and security. But consumers and businesses alike are concerned about the potential misuse of location information.

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ROI from E9-1-1 Services

The impetus behind U.S. carriers' initiatives to offer location-based services started with the FCC directive for wireless carriers to provide E9-1-1 emergency services. The commission requires wireless carriers to improve the reliability of wireless 9-1-1 services and provide the caller's location to emergency services personnel, enabling them to more accurately locate someone in distress. While wireless carriers can identify your location to a certain level of accuracy, it is not as granular as the requirements dictated by the FCC.

The implementation of this more precise location technology is loading numerous related costs on carriers. Depending on the technology of choice — handset, network, or a hybrid of the two — carriers can expect significant expenditures on network equipment and/or new handsets. Offering E9-1-1 services by themselves will not allow carriers to recognize a return on their investments; instead, carriers are looking to generate revenue through additional location-based services. Analysts project carriers will reap upwards of $11 billion in total location-based service revenues by 2005. Therefore, the real driver for carriers to adopt location-based services is the potential revenue stream that comes from the ROI carriers receive from their E9-1-1 compliance.

Overcoming Obstacles to End-User Adoption

Today's technology enables the identification of a caller's location either via manual entry of some location information (street intersections, city name, etc.) or through a modification to the carrier's network that captures the Cell ID of the caller. Regardless of the method used, however, the location information may not be accurate enough to provide the types of services users are expecting.

Bearing in mind that within a city's limits, the radius of the cell coverage could be one mile, the accuracy of the information provided via these location-determination methods is questionable. Coverage accuracy depends on several factors including population and building density, antenna height and strength, the effective radiated power (ERP), and the downtilt of the antenna. Consequently, a request to find the closest ATM could return the location of an ATM 10 blocks away or on the other side of a river instead of the one directly across the street.

As carriers implement technology to meet the FCC's E9-1-1 mandate and location finding becomes more accurate, only then will the new breed of location-based services materialize. That is to say, as the value of the services increase, it is expected that consumer and business subscribers will begin to use the services more, thus bringing in added revenue to the wireless carrier through subscription fees and increased minutes of use.

Other factors affecting the adoption of these new services may include non-friendly user interfaces andthe small screen size of devices, limited bandwidth in the carrier's network, high costs for the carrier to deploy the technology, and the availability (or lack thereof) of location-enabled handsets.

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million handsets in the United States featured location capability, which equates to less than one-tenth of 1 percent. By September 2002, however, GSM handsets will deploy enhanced observed time difference (E-OTD) technology, a hybrid network and handset solution for locating 9-1-1 callers. And by the end of the year, most new CDMA handsets will incorporate assisted GPS (A-GPS), a satellite-based technology that also incorporates land stations to assist in acquiring a handset's position.

Carriers have boosted efforts to get location-enabled handsets into the market, and industry projections suggest that about 95 percent of all handsets will be location-enabled by 2005. (See "Location Technology Handset Summary" on page 64.) Sprint PCS and Verizon Wireless are now offering these types of devices. Sprint PCS launched an A-GPS solution in Rhode Island for E9-1-1 support of 994 PSAPs, and Verizon Wireless deployed a network-based technology in St. Clair County, Ill., and Lake City, Ind. As these handsets are intended to meet the E9-1-1 requirements, industry observers expect that their availability will help to stimulate the development and adoption of location-based services.

The Future of LBS

Despite the hype, it is still too early to tell what the future of location-based services holds. Most of us agree, however, that location is a significant factor in how people organize and interact with the world.

"Location is part of the foundation of future services to be offered to users," says Michael Cosentino, market development manager at Sun Microsystems. "It will help provide a more robust experience for them as we understand more about a consumer's 'context.' Are they at home or traveling? Is it business or vacation? Context allows a more personalized and localized end-user experience."

As carriers deploy next-generation networks and meet the requirements for E9-1-1 location identification, there is little doubt that the public can benefit from resulting location services. If carriers put an emphasis on privacy, they will gain consumer trust while pursing their business interests. ■

Shereen Fink is a solutions architect for Sun Microsystems in Thornton, Colo. Her more than 20 years of experience includes executive responsibilities in the telecommunications industry, specializing in complex, wireline, wireless, and enhanced services; data applications; and large business. In her current position at Sun Microsystems, she is responsible for defining reference architectures for telecommunication carrier's next-generation networks.

MSAG Data Consultants provided the mapping photo shown on page 65. For more information on the company's mapping, addressing, and database services, visit www.msag.com.

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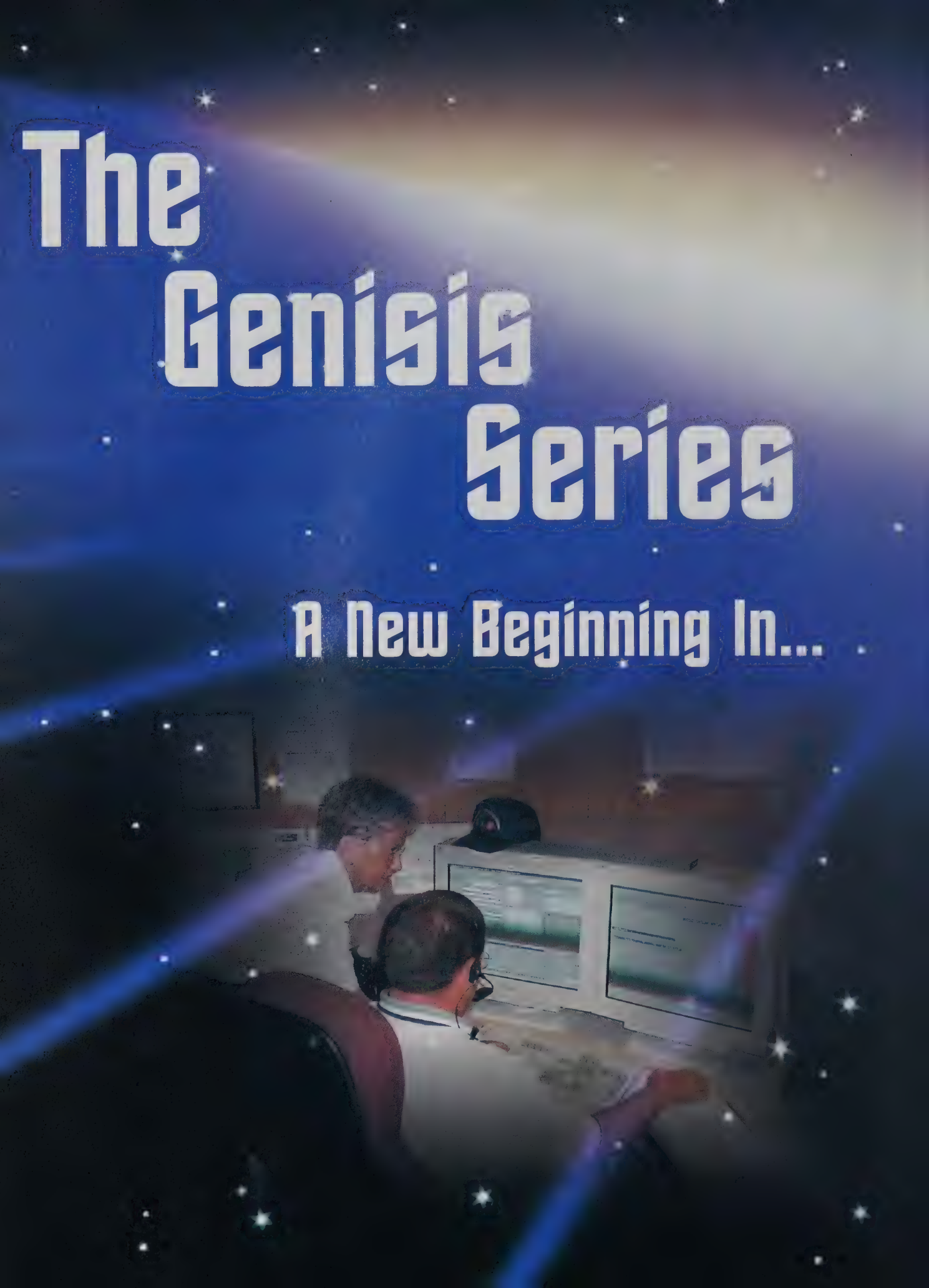

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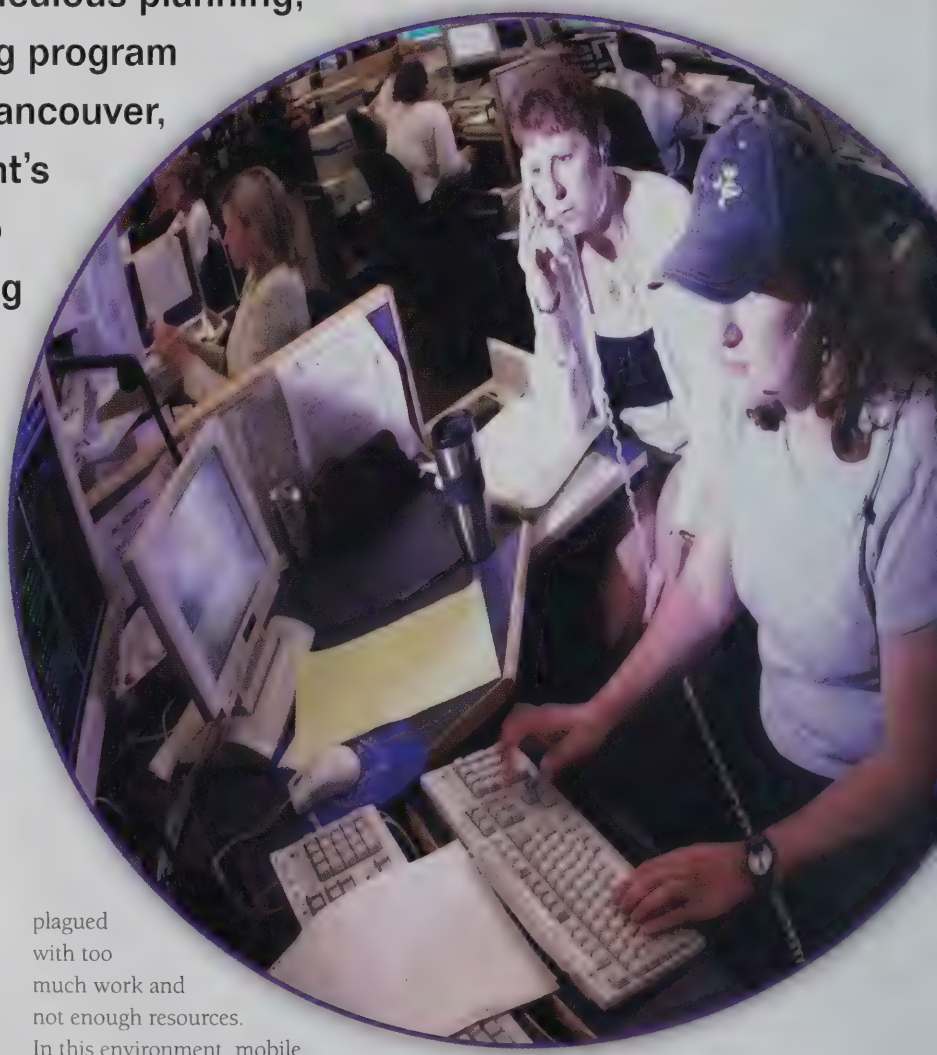
Careful budgeting, meticulous planning, and an effective training program all contributed to the Vancouver, B.C., Police Department's successful transition to a new mobile computing platform.



By Jim Chu

Over the past year, the Vancouver (British Columbia) Police Department completed its transition to a new mobile computing platform known as PRIME-BC. The agency's primary consideration was that the new wireless technologies should drive changes and opportunities for process improvement. Without this result, the transistion would be a futile effort.

The transition to the new platforms required a meticulous project plan, a "just-in-time" training plan budgeted at more than $1 million in staff costs, and a superhuman effort on the part of project team personnel. The transition was expected to be tumultuous and the staff was told to prepare for the biggest change in the department since community policing replaced reactive policing.

A Look Back

The Vancouver PD, like other major city police agencies in North America, is plagued with too much work and not enough resources. In this environment, mobile data technologies have proven their worth over the years by reducing voice radio traffic and, accordingly, dispatch costs.

In 1978, the Vancouver PD installed the first model of Motorola data terminals, which featured "Chiclet"-style keyboards and red LED displays. These units were the prototype for the MDI 9100 series of mobile data terminals (MDTs) that were installed by the tens of thousands throughout the world. The Vancouver PD upgraded to Motorola/MDI 9103 MDTs in 1981, which were operational, along with the original private data system, until June 2001. The Vancouver PD primarily used the legacy MDTs for CAD dispatches; vehicle-to-vehicle and dispatcher messages;

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and handle limited database queries for CAD, motor vehicles, the Canadian Police Information Center (CPIC), and the National Crime Information Center (NCIC). The 20-plus-year life span of the 9100 series is a testament to their rugged engineering and design.

Vancouver PD Call Metrics

	Before system upgrade	After system upgrade
Time before a caller speaks to a police officer	141 minutes	49 minutes
Time spent at the scene and documenting a call	66 minutes	Less than 20 minutes
Time before a stolen property from the report is entered into the RMS and CPIC	8 to 36 hours	Less than 1 hour

The dispatch processes in the Vancouver PD, which were supported by PRC MacroCAD, have been paperless since 1987. The record processes, however, were still paper-based and the legacy records management system (RMS) only indexed occurrences, so investigators had to request copies of paper reports to review details of a crime.

The New Systems

In formulating the business requirements for an upgrade, the agency decided that officers should be able to submit complete reports from the field and remotely access RMS entries, including mug shots.

Hardware. The department procured 200 rugged Panasonic Toughbook CF 28 laptops configured with Pentium III 600 processors, 20 GB hard drives, and 128 MB RAM. The Vancouver PD was the first agency in the world to deploy CF 28 laptops, which were mounted on wireless docking stations. The stations feature a rack-slide docking mechanism; full external replication of the power, serial, antenna, and parallel ports; and an extension arm. In addition, a snakelight and an extra voice radio microphone clip were added. The mounts allow laptops to be moved from a stowed position into the airbag deployment zones, creating a more ergonomic keyboard platform when officers are stationary. And because of the array of electronics now installed in a Vancouver PD patrol car (all Ford Crown Victoria interceptors), the agency purchased battery protection devices.

Wireless data. Each CF 28 laptop is equipped with a built-in modem, which features a 600 mW RF transceiver and meets Mil. Std. vibration specifications, meaning that the laptop can access all systems when removed from its docking port. When docked in a vehicle mount, the laptop connects to an RF amplifier with a built-in GPS receiver that is mounted in the trunk of the police car. The signal strength of the modem can be amplified by up to 3 watts, and the booster increases the CDPD sensitivity through its connection to a low-profile CDPD/GPS car rooftop antenna.

Software. The Vancouver PD also implemented a new RMS and integrated MDT application. The MDT software supports remote reporting and queries such as CPIC/NCIC, RMS, mug shot, and motor vehicle. The CAD interface allows the MDT software to process transactions to and from the legacy PRC MacroCAD. Mapping and AVL software were also integrated.

Departmental Training

One successful transition strategy was to produce a training video outlining the critical need for change. Experienced officers were asked to describe the inherent information sharing gaps in the existing paper-based system. One homicide detective described how his suspect was a witness in another homicide case being investigated by an officer whose desk was across from his. Only a chance conversation linked the cases and the video made it clear that an online centralized data repository was needed.

In addition, training highlighted the problem of officers tied up with paperwork in the office and stressed that mobile reporting would keep officers in their patrol areas. Officers were also informed that the new system would allow them to submit electronic reports and the new RMS would permit real-time access to information.

Training for staff members consisted of 33 hours of in-class instruction, which

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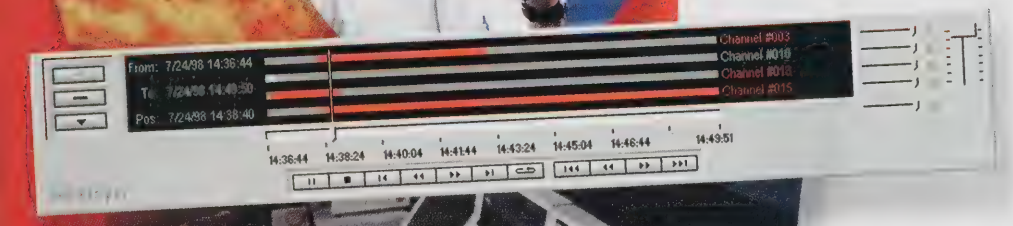

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included hands-on practice with the new application. Students were also led through common operational scenarios. Despite these efforts, however, some members still had trouble adjusting to the new system. The agency deployed trainers in the field for on-site support who were heavily relied upon in the early stages of the transition.

After the initial few months, the questions for the on-site trainers diminished and the Vancouver PD created a team of "super users" who continued as support for the new system. These users were volunteer field personnel who adapted to the new technology quickly and were experts in using the new tools in field situations. The super users were provided advanced training, and because of their experience in an operational setting, some of them were able to provide the trainers with better techniques and usage practices.

Processes Re-Engineered

The Vancouver Police department designed many new work processes

The new initiative combined call center procedures with mobile data entry and access.

including the implementation of workflow management (diary dating and assignment of case files) and many back-end records management functions. The new initiative combined call center procedures with mobile data entry and access. One of the new operational work processes included the deployment in early 2002 of a new unit to "triage" most low-priority calls. The most common low-priority call to the Vancouver PD is a "cold" burglary call (averaging 25 per day), in which a person discovers a business or residential break-in.

In the previous model for handling low-priority calls, the Vancouver PD designated a squad of 25 alternate response unit officers in addition to regular patrol officers to handle the majority of these nonpriority calls. Based on this resource allocation, service metrics were relatively slow (see chart on page 74). Up to 18 percent of callers had to wait six hours or more, and nearly 25 percent of the calls were dispatched to two-officer units

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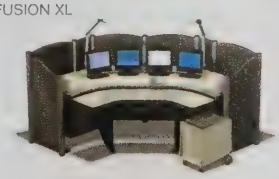

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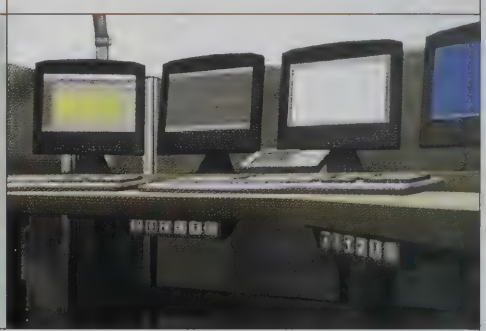

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CIRCLE #59

because only a two-officer car was available within a reasonable waiting period. Information gleaned from the investigation was seriously compromised by the excessive cycle time in the record-entry process. In addition, some of the calls should have been given a higher priority because of factors such as property damage and trauma to the victim.

After Mobile Computing and Digital Data

In January 2002, a new unit was deployed in the Vancouver PD 9-1-1 call center (see "E-Comm Partners with Public Safety" on page 80) to handle nonpriority calls. Police officers were assigned to a new unit with the mandate to begin investigations over the phone. After the reportee was interviewed, the police officers would make entries directly into the records system including "front-page" data such as names and addressees, an M.O. detail page of the crime, property stolen (including serial numbers), and a narrative of the crime.

One successful transition strategy was to produce a training video outlining the critical need for change.

Direct data entry means information is available online as soon as it is entered. Furthermore, at the conclusion of a telephone interview, the call is routed via CAD to the dispatcher, who, in turn, assigns a field unit to the call. This field unit uses a laptop computer to request the entire report (downloaded in seconds), review the report, and then attend to the scene to verify the information and conduct an examination for physical evidence — as opposed to conducting a complete investigation. The time spent on a call is significantly reduced because there is no need to take front-page details. Moreover, only a short supplemental report is required, compared with the previous documentation of the complete incident.

The department received many positive letters from crime victims regarding the prompt response from the police. Another source of positive feedback was that victims now received two police officer contacts rather than one. Dispatchers are elated as well as they do not have to

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CIRCLE #61

E-Comm Partners with Public Safety

In 1994, a major disturbance in the city of Vancouver, British Columbia, illustrated the need for improved public safety communications. The downtown area became engulfed in a full-blown riot as thousands of troublemakers took over the streets. The Vancouver Police Department was forced to call in the crowd control unit and request backup from local Royal Canadian Mounted Police (RCMP) detachments in order to quell the violence, looting, and property damage. Fire and ambulance personnel had to deal with many fires and injuries.

The volume of users quickly overwhelmed the existing Vancouver police radio system, and frontline responders were in danger because incompatible radio systems made it impossible to communicate. Another pressing problem for authorities was that there were 37 separate public safety dispatch centers, most housed in aging facilities.

In response, the Emergency Communications for Southwest B.C. (E-Comm) corporation was formed. E-Comm is owned by the user public safety agencies, and has already provided the following services:

• *An interoperable, wide area, digital trunked radio system.* Hundreds of talk groups are supported on the EDACS system provided by M/A-COM and frontline responders including police, fire, and ambulance personnel can now talk to each other. More than 2,500 user radios have been deployed with more to come, and more than 2.6 million transactions are supported each month. The coverage area will eventually incorporate 13,000 square miles.

• *A post-disaster building that houses a consolidated dispatch center regional PSAP.* In addition, the new radio system, an emergency operations center, a technology center, and an emergency healthcare call center are located in the building.

• *The dispatch center serves as the regional PSAP.* Currently, the Vancouver PD and several detachments of the RCMP are dispatched by E-Comm. More agencies will be moving in as well.

• *A new multijurisdictional and tri-service (police, fire, and ambulance) CAD system.* In Sept. 2001, the Vancouver Fire Department became the first agency to transition to the new Altaris CAD provided by PRC.

• *A multiagency RMS provided by Versaterm.* In addition to the Vancouver Police, the Port Moody Police and the Richmond detachment of the RCMP are using the common RMS, which has database linkages through a product known as the Law Enforcement Information Portal. All three agencies have their mobile computing infrastructure supported by E-Comm.

Public safety managers and practitioners from throughout the world have visited E-Comm. Its public safety successes have more than made up for the growing pains associated with an endeavor of this size and scope. For more information, visit www.ecomm.bc.ca.

juggle the multiple calls waiting with the limited units at their disposal.

The re-engineering allowed the Vancouver PD to reduce the number of alternate response unit officers from 25 to 12. Six officers were newly assigned to the call center, providing a net gain of seven positions. Almost all of the officers assigned to the call center were accommodated and could not work the streets. Some female officers were pregnant and other officers had physical problems such as back or leg injuries. Prior to the deployment of the new processes, these light-duty officers would be assigned administrative duties, creating a vacancy on the streets. Now, an accommodated member could directly assist in the workload of the patrol division.

The triage component of having an experienced police investigator phone a crime victim meant that some calls originally classified as nonpriority were reprioritized higher, either because of the victim's trauma or because of the need to secure evidence quickly. Approximately 50 percent of crime victims preferred that the report be taken over the phone and saw no need for an officer to attend. Based on the nature of the call and the preferences of the victim, if a call center police officer concurred, no patrol unit would be sent to the call. If the victim wanted the police or the investigator saw a need for police attendance, however, the call would be sent back to the dispatch queue for a field unit to be assigned.

Summary

A number of police agencies have implemented a telephone reporting function for minor crimes. The Vancouver PD has been able to take the concept and expand on it by conducting more complex investigations over the phone, without a loss of service or investigative quality. Key to this accomplishment is the ability to remotely review and submit crime reports, which enables the officers in the call center and on the road to efficiently work together on a single case. Of course, none of this would be possible without the extensive training of staff members.

This particular public safety re-engineering initiative illustrates the Vancouver PD viewpoint that this was not a technology project. It was always considered a business re-engineering project made possible by the prudent use of wireless technologies. ■

Jim Chu was Vancouver Police project manager for the E-Comm and PRIME-BC projects. He currently is a district commander. Chu is on the IACP Technology and Communications Committee and on the board of the IACP Information Managers section. He is the author of Law Enforcement Information Technology. *For more information, visit www.lawenfit.com.*

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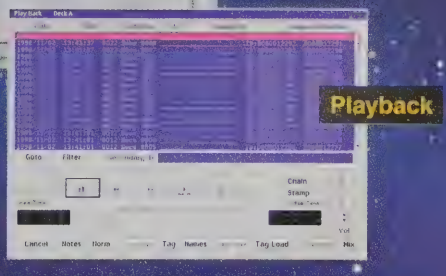

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Quality Monitoring
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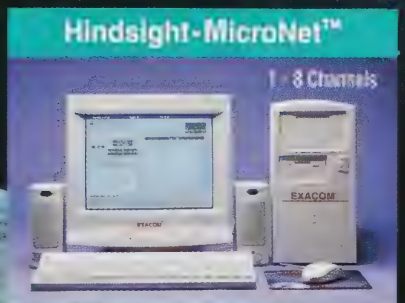
Verification



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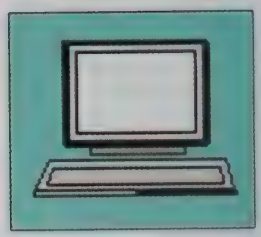
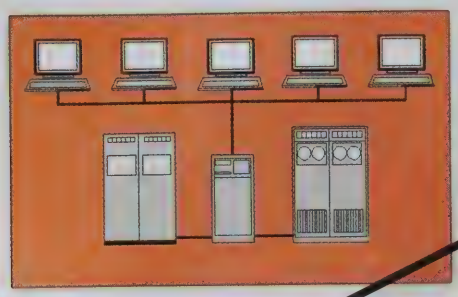
CIRCLE #62

THE EVOLUTION OF CAD

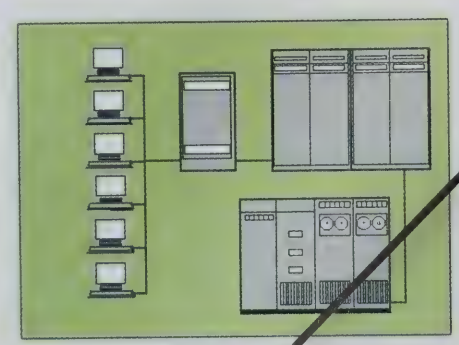


Illustrations courtesy Computer Desktop Encyclopedia



Today

1980s



1970s

Through the age of mainframes and minicomputers to today's user-friendly, Windows-based PCs — 30 years after the birth of computer-aided dispatch systems, the technologies continue to evolve around their original purpose.

By Kathy Imel

Computer-aided dispatch (CAD) systems are designed to record calls for service information, to track resources, and to facilitate the fastest possible response in an emergency situation. While these goals have remained much the same for CAD systems over the past three decades, the systems themselves have evolved significantly — technologically as well as operationally — to better meet the needs of agencies in both the United States and Canada.

While not yet ubiquitous, CAD systems are commonplace among agencies serving communities of all sizes. According to a U.S. Bureau of Justice Statistics' 1999 survey, more than 96 percent of local police agencies doing their own dispatch and serving a population of 50,000 or more use a CAD system. In smaller police agencies, 85 percent of those serving populations of 25,000 to 49,999 and 70 percent of those serving populations of 10,000 to 24,999 use CAD. Even among those departments serving a population of 10,000 or less, the use of CAD increased from 16 percent in 1990 to 36 percent in 1999. Clearly, CAD has become an essential component of today's public safety communication center.

A History Lesson

CAD systems first appeared in the late 1960s. Initially they were custom-written programs, coded specifically for a single agency (usually in assembly language) by computer experts. They ran on large mainframe computers with "dumb" green-screen terminals attached and required costly, dedicated rooms with controlled environments.

The numerous commands needed to control the system, the operational rules, and the dozens of messages that the system provided to the user were all deeply embedded in the program, giving the user little, if any, flexibility for change. In general, these first-generation CAD systems were cryptic, expensive, and cumbersome to maintain, requiring a highly skilled programmer to

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CAD in Canada

Many Americans don't realize that Canada has been using CAD for almost as long as the United States — and that it has gained just as widespread a presence.

One of the first agencies to automate its dispatch operations was the Edmonton, Alberta, Police Service. In the early 1980s, it contracted with PRC for a commercial CAD system. It was written in assembly language and ran on a pair of digital mini-computers. The service subsequently added mobile data terminals (MDTs) in the late 1980s. In the early 1990s, the agency replaced the existing CAD with a new one from Intergraph Public Safety.

By the mid- to late 1980s, CAD was in use by the national Royal Canadian Mounted Police (RCMP), a large number of regional police services in Ontario (Niagara, Peel, York, Durham, Halton, Waterloo, and Hamilton-Wentworth), and in the larger cities such as Vancouver (British Columbia), Calgary (Alberta), Winnipeg (Manitoba), Halifax (Nova Scotia), and Toronto (Ontario). In many cases, both police and fire used CAD. Today CAD is in use by police, fire, and EMS agencies throughout Canada, in cities and towns of all sizes.

Canadian Agencies Using CAD Systems

Agency	Province	CAD Vendor
Burnaby Fire	British Columbia	Intergraph
Calgary EMS	Alberta	Intergraph
Calgary Fire Service	Alberta	Intergraph
Calgary Police Service	Alberta	Intergraph
Campbell River Fire and EMS Service	British Columbia	AVeL-TECH
Durham Regional Police	Ontario	PRC
Edmonton ERD	Alberta	Intergraph
Edmonton Police Service	Alberta	Intergraph
Emergency Health Services of Nova Scotia	Nova Scotia	Tritech
Fredericton Police Force	New Brunswick	Versaterm
Halifax Police Service	Nova Scotia	PRC
Halton Regional Police	Ontario	PRC
Hamilton Fire Service	Ontario	Intergraph
Hamilton Police Service	Ontario	Intergraph
Kamloops Fire and Rescue Services	British Columbia	AVeL-TECH
Kingston Police	Ontario	Versaterm
Laval Police and Fire Services	Quebec	Positron
Lethbridge Police	Alberta	Intergraph
Lethbridge Fire	Alberta	FDM
London Fire	Ontario	Intergraph
London Police Service	Ontario	Versaterm
Medicine Hat Police Service	Alberta	Versaterm
Miramichi Police Force	Prince Edward Island	Versaterm
Montreal Police	Quebec	PRC
Montreal Urgences-Sante Ambulance	Quebec	AVeL-TECH
Moose Jaw Police Force	Saskatchewan	Versaterm
New Brunswick Ambulance Service	New Brunswick	AVeL-TECH
Niagara Regional Police	Ontario	PRC
North Island 911 Corp.	British Columbia	AVeL-TECH
Ontario Ministry of Health	Ontario	Tritech
Ottawa Police Service	Ontario	Versaterm
Peel Regional Police	Ontario	PRC
Prince Albert Fire Department	Saskatchewan	Versaterm
Province of Ontario Integrated Justice	Ontario	Intergraph
Quebec City Police Service	Quebec	PRC
Regina Police and Fire Services	Saskatchewan	PRC
Rothesay Regional Police	New Brunswick	Versaterm
Royal Newfoundland Constabulary	Newfoundland	Versaterm
Saskatoon Police Service	Saskatchewan	Versaterm
Thunder Bay	Ontario	Intergraph
Toronto EMS	Ontario	Tritech
Toronto Fire Services	Ontario	Intergraph
Toronto Police Service	Ontario	Intergraph
Vancouver Police and Fire	British Columbia	PRC
Waterloo Regional Police	Ontario	PRC
Winnipeg Police Service	Manitoba	PRC
York Regional Police	Ontario	PRC

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APCO Project 36

The ability to interface to other CAD systems has become a big issue for a lot of agencies. The issue is so important that the Association of Public-Safety Communications Officials (APCO) International established Project 36 to develop standards for facilitating CAD-to-CAD communication. The draft of the proposed Project 36 standards can be found on the Oklahoma Chapter APCO Web site, www.okapco.org/p36.htm.

make any modifications. Cities such as Dallas and Detroit that had skilled programming staffs wrote their own systems, which they still maintain today.

Soon, a few companies began to emerge that wrote customized CAD systems for the handful of large, well-financed agencies that could afford such systems. Throughout the 1970s and early 1980s, only a few companies marketed these products nationally; their specialties were in handling large volumes of calls for service, processing calls quickly, interfacing to other mainframe computers, and supporting complex unit suggestion algorithms. Later, as hardware prices began to decrease with the advent of minicomputers, some smaller CAD companies were established. These companies generally focused their sales efforts in the region surrounding their headquarters.

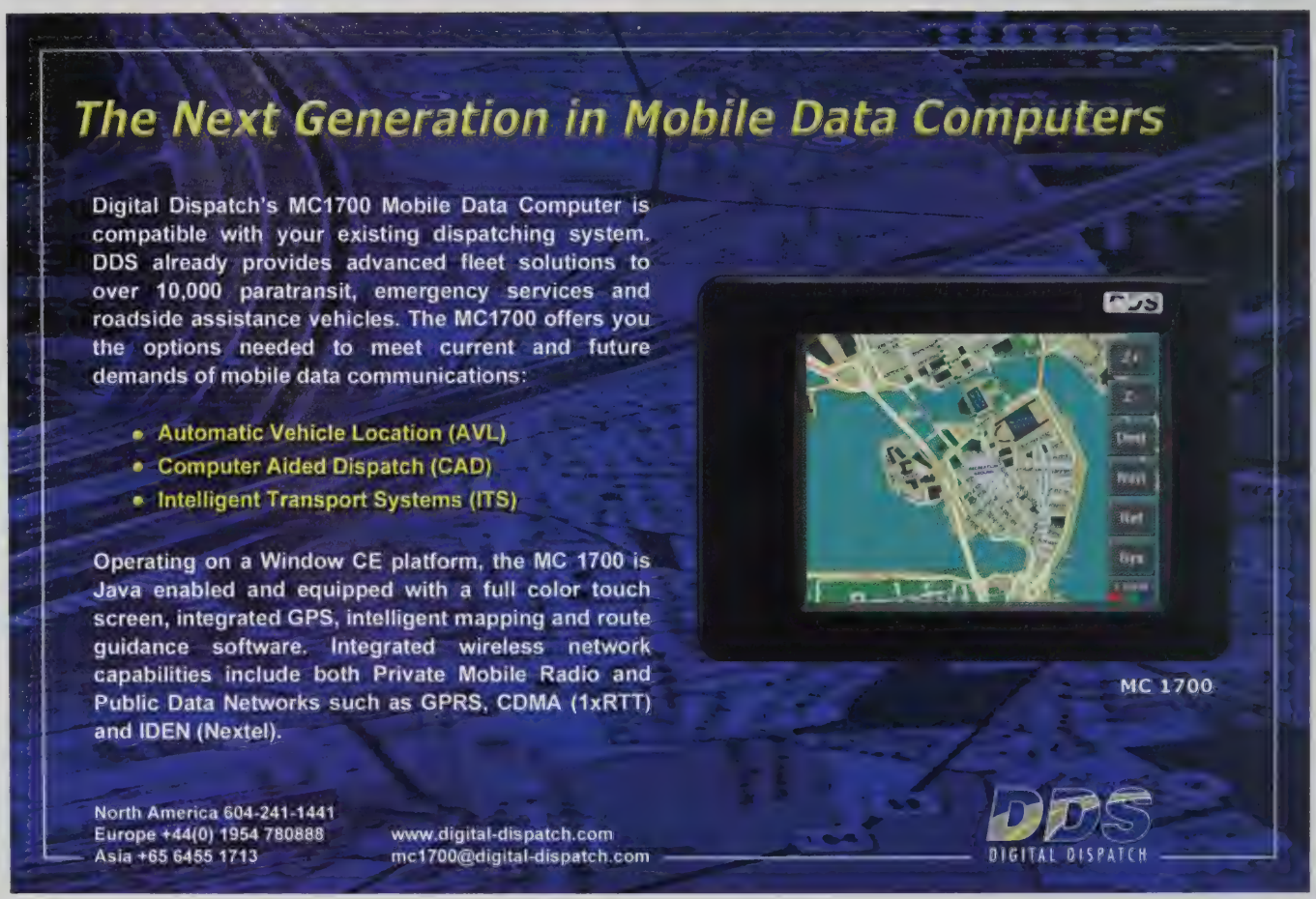
By the late 1980s and early 1990s, many U.S. and Canadian cities with populations of 100,000 or more had either acquired CAD or were seriously considering it. And of those that had purchased CAD systems, a large majority included mobile data systems — using dumb mobile data terminals (MDTs) and dedicated radio infrastructures — in their purchases.

By the mid-1990s, with constantly decreasing hardware costs and ever-increasing computing power, the cost of entering the CAD market had dramatically decreased. As a result, more companies began offering systems that were affordable to mid-sized and even small cities such as Riverview, Mich., which has a population of 15,000.

To better understand this level of growth, consider this: Throughout the 1980s, the number of CAD vendors remained small and relatively constant. From 1988 to 1998, however, the number of CAD vendors attending the Association of Public-Safety Communications Officials (APCO) International conference quadrupled. Today, more than 150 companies offer some type of CAD product.

The Early Adopters

Each of the 10 largest U.S. cities currently use CAD, and most implemented their systems in the 1970s or 1980s (although only the EMS part of New York Fire is automated; the rest is still manual). Most of these systems were written either by in-house staff or as a highly customized program by a CAD vendor (see table on page 88).



CIRCLE #65

For example, the San Antonio Police Department developed its own CAD system in the 1970s, about the same time the department introduced portable radios for their patrol officers but before the implementation of 9-1-1. Mobile data terminals for the patrol vehicles were introduced in the mid-1980s. Over the years, San Antonio's programming staff has constantly enhanced and upgraded the system to meet the changing needs of the department, allowing the department to effectively handle more than 800,000 calls annually.

On the other hand, the Phoenix Fire Department began using a commercial CAD product from PRC in 1982. The Phoenix Fire Department was one of the earliest users of MDTs for fire apparatus, even creating a rudimentary mapping capability in the MDTs. Today the Phoenix FD has 300 mobile devices as part of its system.

In 1994, the vendor upgraded its existing software, adding a number of new features including AVL and a multijurisdictional dispatch capability, which allows the agency to dispatch for 15 other fire departments in the greater Phoenix area, handling more than 170,000 emergencies yearly.

The size, complexity, and extent of customization has made the replacement of these massive legacy systems extremely difficult and extremely expensive. One of the largest projects currently underway is the replacement of the Los Angeles Police Department's existing CAD system. The Los Angeles PD is hoping to launch its new system by late 2002 — at the same time it moves into a new communications facility.

Many large, mid-sized, and even small agencies are now finding they have outgrown their existing CAD systems and are replacing them with more sophisticated, flexible, and powerful systems. Continued funding from the federal COPS-MORE program, a Department of Justice grant initiative that funnels money to state and local public safety agencies, has helped make this possible upgrade for a number of agencies.

The Look of CAD Today

The majority of today's fourth-generation CAD systems run on PC-based servers using Microsoft's Windows operating system, although some CAD vendors still offer Unix-based systems (some with remnant proprietary operating systems) geared toward high-volume clients.

Relational databases are now the standard for data storage. The two most prevalent systems are Microsoft's SQL Server and Oracle's databases. The new systems no longer need the extensive dedicated power and air-conditioned facilities of their beefy predecessors.

Customer service also has improved dramatically. Most CAD providers now offer dedicated customer support departments, many with 24-hour help desks. Annual user group meetings, product steering committees, and periodic newsletters are common. In place of individually customized systems, more companies are offering "shrink-wrapped" solutions that can be tailored to the user through customizable tables, allowing the companies to include new feature releases as a part of their standard maintenance programs. →

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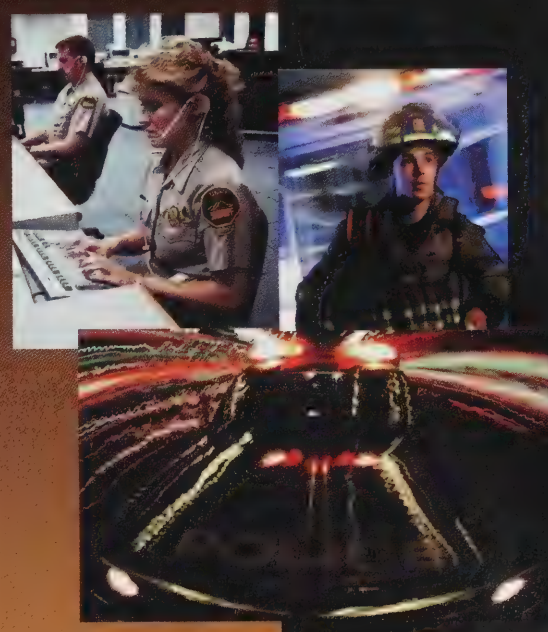

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Ten Largest Cities in the United States and Their CAD Systems

Rank	City	Population (2000)	Year CAD first installed	Most recent CAD installed	CAD vendor
1	New York	8,008,278			
	- Police Department		1972	same	In-house[1]
	- Fire Department		none/1984	none/same	Fire-none/EMS-PRC
2	Los Angeles	3,694,820			
	- Police Department		Late 1970s	1983	In-house[2]
	- Fire Department		1976	same	GRC/In-house[3]
3	Chicago	2,896,016			
	- Police and Fire Depts.		1996	same	PRC
4	Houston	1,953,631			
	- Police Department		1987	same	PRC[4]
	- Fire Department		N/A	N/A	In-house[4]
5	Philadelphia	1,517,550			
	- Police Department		1970s	1988	PRC
	- Fire Department		1970s	1988	PRC
6	Phoenix	1,321,045			
	- Police Department		1970s	1993	PSSI
	- Fire Department		1982	1994	PRC
7	San Diego	1,223,400			
	- Police Department		1980s	1991	PRC
	- Fire Department		1991	1998	TriTech
8	Dallas	1,188,580			
	- Police Department		1970s	same	In-house
	- Fire Department		1977	same	In-house
9	San Antonio	1,144,646			
	- Police Department		1970s	same	In-house
	- Fire Department		1970s	same	In-house
10	Detroit	951,270			
	- Police and Fire Depts.		1987	same	In-house (with Unisys)[5]

[1]Under contract with Compaq/Printrak for replacement
[2]Under contract with Printrak for replacement
[3]In-house staff currently migrating entire system to C++
[4]Under contract with PRC for major upgrade/replacement
[5]Currently evaluating proposals for new CAD

Today's CAD systems feature sophisticated graphical user interfaces (GUI) and are table-structured to give the end user control over the look and feel of the system without requiring a great amount of technical expertise. They support complex multiagency, multijurisdictional scenarios with many external interfaces. Commands and messages are stored in tables, which makes changing operational procedures much easier. Drop-down pick lists and embedded "help" features make training and use much easier. Integrated mapping, digital image capture-and-display, and the inclusion of Internet-style browser technology are now commonplace.

The continuing evolution of general-purpose computing hardware and software including PDAs, heads-up displays, streaming video, and XML, is driving CAD in new and interesting directions. CAD functionality also continues to evolve as the needs of the users push it in new directions. For example, the number of new and complicated interfaces required by agencies has increased dramatically over the last decade, contributing largely to the increased cost of labor for software development and system integration.

In the future, these interfaces will become more tightly integrated, giving the user virtually seamless access to information, whether it be CAD or records management systems (RMS), inside or outside the agency, mobile workstation or fixed — all of which will continue to support the original goals that CAD was designed for. ■

Kathy Imel is president of La Loba International, a consulting firm providing management, business development, and procurement assistance to businesses and public sector agencies, specializing in public safety information technology. She also offers the WolfTRAX "Be Your Own Consultant" workshop series to teach the basics of RFP writing, vendor selection, contract negotiation, and project management to public safety personnel. Imel has more than 20 years of experience providing IT solutions to clients in the United States and Canada. She can be reached at kjimel@aol.com.

Acknowledgments: *The author wishes to thank David Lea, Yu Ping Luo, Mike Drewes, Gregg Caplan, TriTech Software Systems, and the Phoenix Fire Department for providing information for this article.*

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Cooperation Equals Interoperability

Each Project 25 standard is written to ensure that public safety personnel in the field can count on their equipment when they need it most. Not surprisingly, the ensemble of Project 25 corollary technology and products has increased dramatically during the last year.

By Craig Jorgensen

APCO Project 25 is a cooperative effort to create standards for the public safety community with input from representatives at the federal, state, and local levels, and three associations — the Association of Public-Safety Communications Officials (APCO) International, the Association of Telecommunications & Technology Professionals in State Government (NASTD), and the Telecommunications Industry Association (TIA), which in accordance with its policies, procedures, and engineering manual creates the actual standards. The standards that have evolved from the APCO Project 25 process are known as Project 25 standards, or ANSI/TIA/EIA Series 102, 902, and 905 standards.

This cooperative effort has created a suite of more than 33 standards, telecommunications systems bulletins, and white papers pertinent to digital, two-way radio technology for public safety and other commercial markets. The suite now includes comprehensive 12.5 kHz FDMA standards and 6.25 kHz FDMA standards, and will soon include 12.5 kHz two-slot TDMA standards and data standards for public safety users in the newly allocated 700 MHz band. The two-slot TDMA standards will be based on a proposal submitted by EADS of France and Nortel Networks that was formally approved by the Project 25 Steering Committee in January 2002.

Of course, that proposal and subsequent submissions will be accepted, modified, and, in some cases, rejected in the TIA process. The proponents of this latest offering anticipate the new standards to be complete in the 2004 to 2005 time frame. Unfortunately, an earlier four-slot TDMA submission backed by the Project 25 Steering Committee was formally withdrawn from further consideration by its proposers.

Increased Attention

During the last year, interest in the Project 25 family of standards and its corollary technology and products increased dramatically. As more and more public safety and commercial customers consider Project 25 products, more manufacturers have accommodated the demand.

The increased acquisition and use of Project 25 technologies is seen as a natural outgrowth of the steering committee's demand that all Project 25 standards migrate gracefully from generation to generation. With the P25 planned migration strategy, users can progress from the analog systems of the past to the digital trunked and conventional systems of tomorrow on a seamless basis, without leaving stranded investments.

Project 25 is the only official public safety digital standard in the U.S. marketplace that offers criteria for both conventional and trunked radio systems. Project 25 is also the only standard that offers an operational and spectrally efficient direct mode as an integral part of the common air interface (CAI).

User Focused

Because Project 25 standards are so comprehensive and flexible, they can accommodate the small user who requires a conventional base and two mobiles as well as the very large user who requires a statewide, trunked radio system. The technology may be deployed as a narrow-ribbon system, similar to the one being tested by a major U.S. railroad for voice communications and train data monitoring, or as a trunked system for a large regional area, such as that in Phoenix and Mesa, Arizona. The standards also allow a user to combine trunked and conventional approaches for mixed density systems such as statewide systems.

Since the Project 25 standards are predicated on user requirements, the focus is on finding the most efficient and effective solutions for the public safety community. Each standard is written to ensure that public safety personnel in the field can count on their equipment when they need it. The end result is product offerings that have been through a form of value engineering long before becoming standards, let alone products.

Project 25 is the only official public safety standard in the U.S. marketplace that offers criteria for both conventional and trunked radio systems.

The Project 25 process makes it possible for users to have compliant aircraft radios, direct mode communication, multiple levels of secure encryption, and over-the-air rekeying (OTAR). These standards provide a technology platform with sufficient mobile and portable power levels while minimizing the number of quality satellite receivers needed for geographical coverage. Phase I FDMA supports equipment that has equivalent power levels, the same receiver sensitivities, and coverage comparable to today's analog technology. End users will find the established

performance criteria important to their overall system design and decision-making process.

Global Aspirations

The Project 25 and TIA teams are working with public safety partners in Europe, including the European Telecommunications Standards Institute (ETSI), to ensure that the high-speed, digital, broadband data service of tomorrow will be accommodated through a more harmonized standards effort that considers both North American and European public safety user needs. That standards effort, known as Project MESA, will truly reflect a more global perspective of public safety's future digital data requirements.

We need to find ways to cultivate agreements and minimize our self-serving, antiquated parochial perspectives.

The P25 Steering Committee along with the Users Needs Committee is in the process of reviewing and rewriting its P25 Statement of Requirements (SoRs) to be more user-friendly. The steering committee and its partners in TIA are also focusing additional attention on the standardized interfaces to make sure public safety users can take full advantage of and benefit from proposed standardized interfaces for network management, fixed base stations, consoles, and other functions.

This year the steering committee and its partners in TIA will continue to formulate standardized protocols that take full advantage of some of the attributes of IP services. While the main efforts of the past have focused on activities directly related to Project 25, the group now places increased importance on the Project MESA process and the new TIA data standards for the 700 MHz band.

Future Goals

The Project 25 Steering Committee along with association and government agency sponsors is keenly aware of the need to ensure future standardization efforts reach an ever-expanding marketplace. The group recognizes that some people think the various standards efforts throughout the globe are in competition with one another. The P25 Steering Committee does not believe these standards compete; rather, they meet a specific user group's needs. In fact, with some modification, other standards could become complementary to P25 standards.

While the P25 standards embody a set of suitable standards for U.S. public safety users, other users have special needs that can only be resolved through other standardized or proprietary technologies. The steering committee is not insensitive to criticism, but reiterates that its decisions are based solely on the needs of U.S. public safety users. The global hurdle only motivates the group to continue its efforts to ensure that, when possible, future standards are created in cooperation with other world partners. The goal is to create an environment where the only barrier to complete interoperability will be a user's choice to accept or reject that capability. By adopting that strategy, Project 25 can ensure users the security they require to protect themselves and the taxpayers they serve.

The Project 25 Steering Committee is committed to creating national standards and even global standards when necessary. The process is difficult, time consuming, and costly, but U.S. public safety agencies can no longer live in isolation of a global marketplace. The Project 25 Steering Committee strives to acquire the distinctive competencies of a global marketplace to assure all future standards meet the needs of U.S. users and their global partners.

The steering committee cannot ignore the very real fact that the United States shares some of the same problems and objectives with the committee's partners in Europe and elsewhere in the world. We need to find ways to cultivate agreements and minimize our self-serving, antiquated parochial perspectives. The challenge remains the future. Are we willing to sacrifice now to meet it? ■

Craig Jorgensen is chairman of the Project 25 Steering Committee. He is a past president of APCO and NASTD and has served on numerous regulatory and standards committees at both the state and national levels. Jorgensen is also project director for Project 25 and is president of Quantum Telecommunications, Salt Lake City, a telecommunications consulting firm that designs, implements, and manages telecommunications projects and analyzes telecommunications management systems. He can be reached by e-mail at jorgensen@sisna.com.

For more information on Project 25, visit www.project25.org, www.apco911.org, and www.projectmesa.org.

Endnotes: *Federal participants include, but are not limited to, the Federal Bureau of Investigation, the Department of Treasury, the National Communications Systems, the Department of Justice's National Institute of Justice (NIJ), and the National Telecommunications and Information Administration (NTIA).*

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Ahead of the Curve

Bucking the trend toward government-owned systems, the Tuscaloosa County (Alabama) Sheriff's Office signs up for commercial wireless service.

By Michael Smith

One of the first things visitors to Tuscaloosa County, Ala., may notice are the Mercedes-Benz M-Class sport utility vehicles driven by county sheriff's deputies. They use the vehicles as part of a unique project with Mercedes-Benz to test the vehicles' durability after enduring extreme road conditions and traveling considerable mileage. While out of the ordinary, the program is a great example of public and private organizations working together to benefit the community.

In fact, the Tuscaloosa County Sheriff's Office is anything but ordinary. In addition to the Mercedes-Benz vehicles, it maintains an airplane, a patrol boat, and an armored personnel carrier. With multiple patrol units operating across Alabama's largest county, the Tuscaloosa Sheriff's Office also uses the latest technology for wireless communications. CAD, mobile data terminals, and wireless handsets are all part of the communications arsenal.

Wireless Communication Strategies

The sheriff's office selected commercial operator Southern Linc, a subsidiary of Southern Co., to handle its communications operations. Based on iDEN technology from Motorola, the Southern Linc handsets combine phone service, two-way radio, paging, and wireless data access in a single device, and the network offers voice and data coverage in urban and rural areas. Private communication is very important since at times calls to the sheriff's office are of a sensitive nature and information could be compromised if people listened in on a scanner. The network is entirely digital and inherently private.

In total, the Tuscaloosa County Sheriff's Office uses 88 handsets, five radio base stations, and 10 mobile data terminals. With the integrated communications options available on the handset, an officer can communicate using two-way radio or phone service.

For its CAD operations, the sheriff's office uses four base radios that are integrated with tracking computers and E9-1-1 Phase I service. E9-1-1 captures a distressed caller's phone number so that a 9-1-1 operator can call back if a call is disconnected. In 2001, the Tuscaloosa County Sheriff's Office received more than 52,000 calls. It also handles dispatch operations for 19 volunteer fire departments in the area.

Mobile data terminals mounted in the patrol cars provide wireless access to local and national crime databases, enabling deputies to run vehicle tags and wanted checks on motorists from the safety of their patrol cars. By arming themselves with information, deputies can be better prepared when approaching vehicles.

The sheriff's office also maintains a base radio to provide wireless communications for its mobile command post, which can be transported and set up anywhere in the county within an hour. The mobile command post was an integral part of the office's response to the F4 tornado that struck Tuscaloosa County in December 2000. Officers used it for

staging, meal breaks, and planning for checkpoints. When all other communications systems were down, Southern Linc's network remained fully functional and allowed officers to organize search-and-rescue operations for people who were injured or trapped.

Managing Mobility

The Tuscaloosa County Sheriff's Office is extremely mobile and has the capability, if needed, to fly long distances in its Cessna 182 airplane. The plane is used for air patrol, to extradite suspects, transport prison inmates, and survey damage from natural disasters. It is outfitted with a handset, enabling a pilot to stay connected with the sheriff's office.

This mobile office works extremely well for inmate transfers; the airplane is used to provide security cover for vehicles transporting prisoners. From the air, the officers can use two-way radio to warn drivers of roadblocks or potential traffic problems ahead, ensuring a safe and smooth operation.

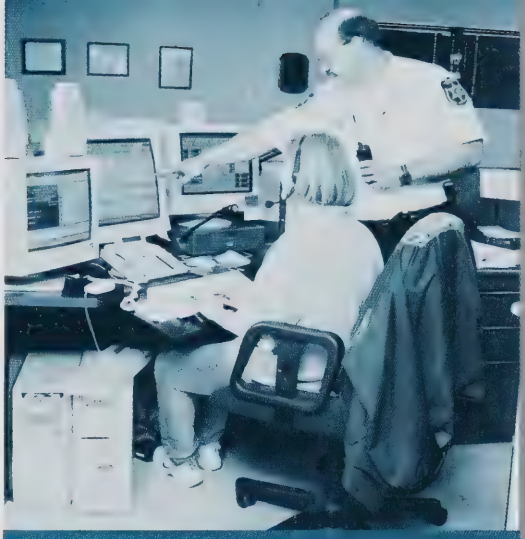
The sheriff's office also can enforce speed limits from the air. The pilot clocks the movement of a vehicle over a certain distance and uses a mathematical formula to determine speed. If a motorist is detected as speeding, the pilot can then radio a patrol car. Most airplane communication systems are UHF-based, broadcasting for hundreds of miles. Using an inherently private digital network, the Tuscaloosa County Sheriff's Office has private communications, even from the air, that are not distracted by other people's radio traffic. Private communications with the airplane is a significant benefit, especially if a pilot is trying to survey narcotics operations and wants to avoid being picked up on scanners.

Commercial vs. Government Systems

While many law enforcement agencies across the country maintain their own radio systems, the Tuscaloosa County Sheriff's Office uses a commercial service. One reason is that private businesses have the resources to keep up-to-date with the latest advances in technology, whereas governments must allocate resources across several different areas. In addition, the sheriff's office simply pays a monthly bill; it doesn't need to worry about maintenance, equipment, inventories, radio towers, or generators.

Commercial operators such as Southern Linc offer interoperability since their networks make it possible for law enforcement offices to communicate with other government entities (fire department, poison control, public works, or the local police department) if they also sign up as customers.

Communication is the backbone of any law enforcement operation. Having the right information in a timely manner is critical to solving crimes. The Tuscaloosa County Sheriff's Office works hard to procure the best equipment — from patrol vehicles to airplanes to wireless technology — assisting officers with their jobs. By using wireless voice and data solutions from a commercial service provider, the officers benefit from having instant communication that will help them prevent crimes, perform rescue operations, and enhance public safety for the citizens of Tuscaloosa County. ■



CAD, mobile data terminals, and wireless handsets are all part of the communications arsenal.

Michael Smith is governmental manager for Southern Linc.

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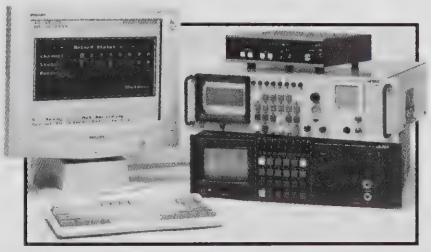

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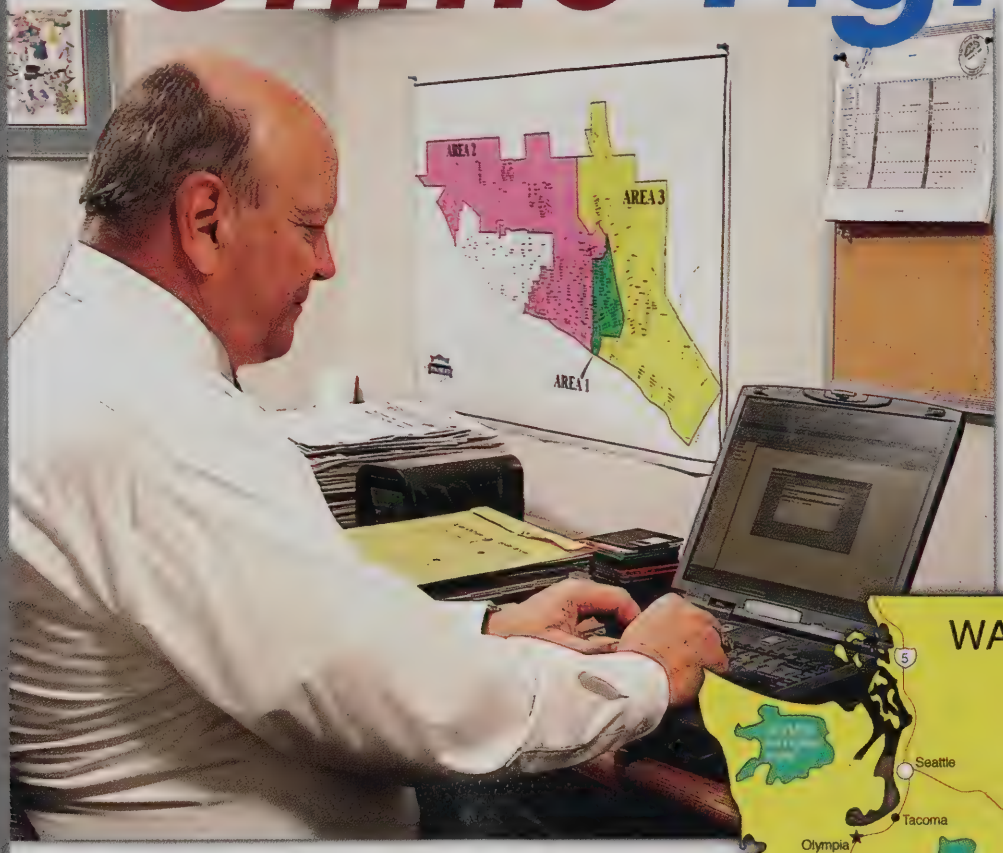
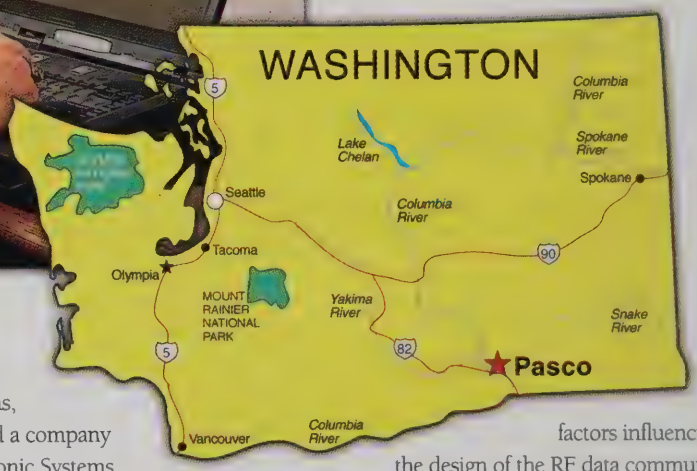


Wireless MDC system helps Pasco, Wash., reduce crime by 53 percent.



By Jan Jackson

It was June of 1995 when Denis Austin stepped off the plane in Pasco, Wash., to start his new job. Austin was the new police chief of Pasco, a small community in the dry, eastern section of the state known among neighboring cities for its high crime rate and gang activity.

As Austin began driving the streets, he noticed a lot of gang-related graffiti. It didn't take long for him to formulate a new vision for the department, namely to be a "community policing department." His officers needed to be more visible in the community, but they were so busy running to crime scenes, the only visibility they had was negative. Austin also knew his department needed to be technologically superior to the criminals it hoped to deter if it was going to win the crime battle.

Two neighboring cities had successfully implemented mobile data computer (MDC) systems, but they spent approximately $11,000 per car to set up the system. Austin couldn't justify spending that much money in a city with a population of only 22,000 people. In researching MDC systems, Austin found a company called Electronic Systems Technology (EST) that was located just a few miles from his office. He contacted the company, and the city of Pasco soon became a beta test site for an MDC system developed by EST.

Five years after the implementation of the MDC system, Pasco had gone from having the third highest crime rate in Washington to a below average rate for the state, dropping from 90 incidents per 1,000 people to 50. Gang-related incidents decreased 71 percent. The city has not had a gang-related homicide since 1997, and the downtown streets of Pasco have seen a noticeable reduction in graffiti in the years since the implementation of the MDC system.

Behind the Scenes

At the outset of the MDC system implementation, customer support engineers initiated a formal RF site survey. They conducted on-site measurements and analysis to determine factors influencing the design of the RF data communications system including RF signal levels between systems, co-channel emitter frequencies, signal strengths, and RF data quality. After completing the analysis, the engineers prepared a formal site survey report that documented the findings and planned the installation and hardware requirements for Pasco's MDC system. The site survey determined that the city would need one base station, an RF repeater located on an existing 168-foot water tower, and an initial placement of five wireless modem/laptop computer systems installed in patrol cars.

The police department chose an affordable modem that offered secure packet burst encrypted transmissions and featured a high data rate of 19,200 bps, while maintaining data accuracy of greater than one part in 100 million. The modems could simultaneously operate as a master and repeater node, which provided a tremendous cost advantage over conventional systems that

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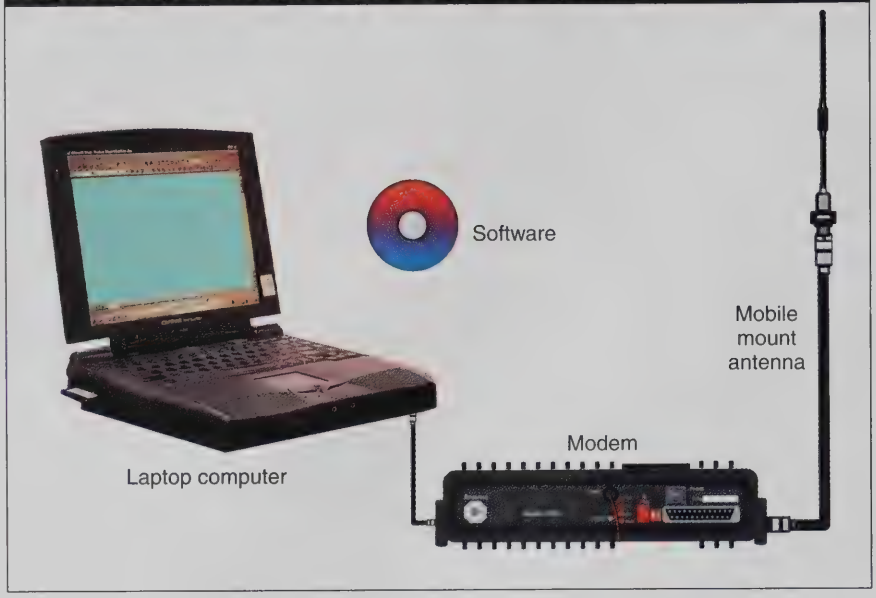
CIRCLE #70

Figure 1: System components of Pasco's MDC system

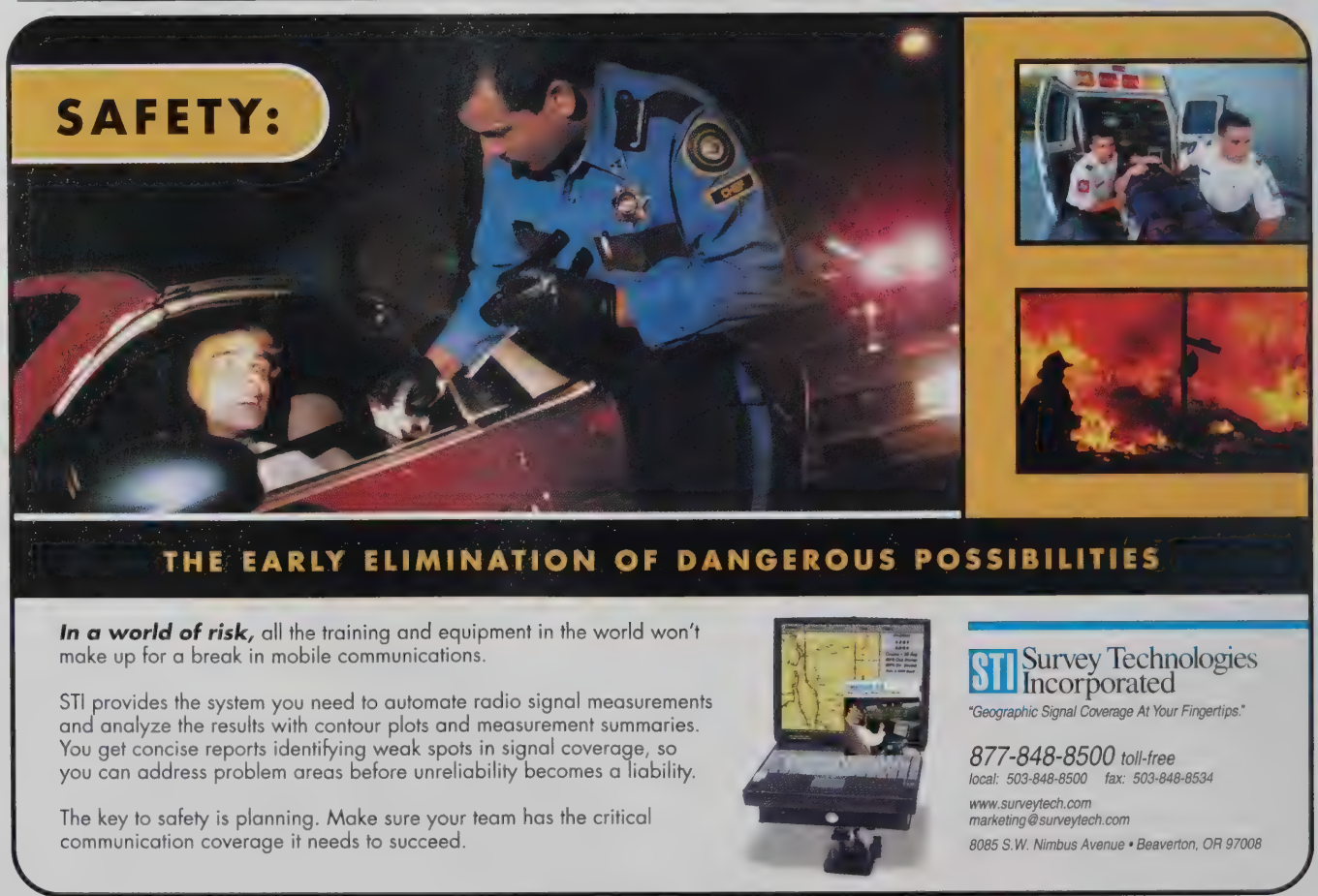


required leased hard wires from repeater sites to base stations. The base station, located in the police department building, consisted of a modem with power supply, base station servers, linear amplifier with power supply, lightning arrestor, and antenna. The linear amplifier boosted the power output to 25 watts, which was necessary to reach outlying areas.

The modems were initially mounted in the patrol car trunk and later remounted behind the passenger seat of the patrol cars along with a laptop computer that was docked next to the driver's seat for easy access. Instead of using an expensive laptop specially designed for MDC systems, an over-the-counter laptop was chosen and installed for about half the price. Each laptop was the responsibility of the assigned officer.

The repeater module included a modem with power supply, a linear amplifier with power supply, a lightning arrestor, and an antenna (see Figure 1). These four components were installed in a weatherproof enclosure that provided protection from the elements. The module was mounted on an existing city-owned water tower.

The software package was a Microsoft Windows-based mobile data software solution that provided public safety personnel with real-time wireless access to National Crime Information Center (NCIC), National Law Enforcement Telecommunications System (NLETS), and state/local databases using advanced radio technology. The software also delivered access to legacy systems and other applications, CAD/RMS integration,



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and messaging. In addition, engineers initiated a gang member database that could be accessed through the MDC system. Two information specialists from the city of Pasco were assigned to the MDC project. They worked very closely with the engineers during the entire process.

Once the MDC system infrastructure was in place, engineers verified the results of the site survey. This critical re-evaluation of the RF system insured the MDC system would provide coverage in every corner of the city.

Realizing the Goal

Instead of paying $11,000 per unit, Austin spent only about $4,800 per unit. Initially, it was estimated the system would save officers 3.8 man-years of time over the year. That figure proved to be an underestimation, however, and over the next five years, the MDC system saved officers an average of 7.8 man-years of time, or about $367,000 per year.

Pasco shares dispatch with Franklin County, and it wasn't long before the county wanted an MDC system as well. Customer support engineers performed another site survey and added an RF repeater on top of the 3,000-foot Rattlesnake Mountain and another on a tower in the town of Mesa, which lies about 20 miles north of Pasco. By tying into the central backbone already established in Pasco, Franklin County was able to have an MDC system at a reduced cost.

Additionally, it provided both agencies with a redundant back-up system. The number of patrol cars with MDC systems increased from the initial five vehicles to 16, and the number of officers involved increased to 26. Recently, the Washington State Fish & Game Department also installed in-vehicle mobile computers that work with the city/county system. Austin hopes to eventually run all dispatch through the MDC system, eliminating unauthorized individuals or criminals from listening to police scanners and targeting crimes based on the location of police.

The low-cost MDC system has been instrumental in reducing crime; it has given Pasco police officers a real-time communication source with local, state, and national databases at their fingertips. The MDC system also has saved local taxpayers a lot of money, and the agency has a more positive visibility in the community. Perhaps most importantly, Austin is making headway toward his goal of every officer being a "community policing officer." Instead of specializing in one area of crime, everyone in the department can track criminals with the MDC system. ■

Jan Jackson is a contract marketing consultant who has been writing business-to-business literature for 17 years for clients such as Bechtel, Westinghouse, Battelle, and Siemens. Chief Denis Austin contributed to this story. Austin has served as chief of police for Pasco, Wash., since June 1995. He is a strong proponent of community-oriented policing and has implemented major changes in his department to reflect this philosophy.

EST has installed wireless modem systems at industrial sites around the world since 1986.

CIRCLE #72

TECH TOOLS

By Angela Langowski

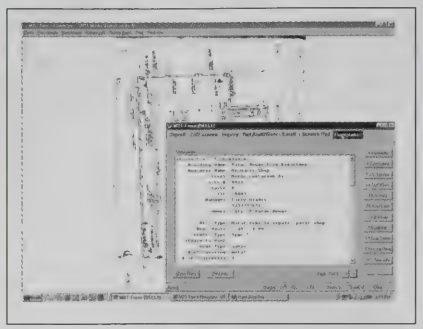
Field Reporting

Wireless communications has become an essential element in many public safety agencies' fight against crime. The ability to access real-time motor vehicle and warrant information can reduce the risk of potentially dangerous situations for officers. Field reporting tools include many components such as CAD, a records management system (RMS), access to corrections information, and mobile computing to track criminal events that occur in an officer's jurisdiction. When mobile computing is used in conjunction with CAD and RMS, officers can more effectively attain information while in the field, and save time by preparing incident and accident reports. Please use the reader service card on page 131 if you would like more information on any of these items or, for faster response, go to "Reader Service" at www.radioresourcemag.com.

ADSI

The company's WriteForce field-based reporting software runs on Microsoft Windows 95, 98, 2000, and XP, among other operating systems. First released in 1993, the latest version allows a police department's in-house records management system (RMS) to be delivered to an officer in the field via WAN connection. Officers can use the software to help complete offense reports, tickets, field interviews, and arrests.

The MDCForce software has 42 pro-



grammable function keys. The product uses radio and CDPD technology to access state and national databases and communicate CAD-to-cruiser and car-to-car. When the software identifies an address that has an existing floor plan on file, the system alerts the officer or responding fire unit of the available floor plan. Visit www.e9.com. ***Circle #110***

Aether Systems

PocketBlue 2.0, a wireless handheld application for National Crime Information Center (NCIC) query and secure text messaging, is now available on the Pocket PC-based Compaq iPAQ, in addition to Research In Motion (RIM) and Palm products. PocketBlue 2.0 also adds a comprehensive field interview tracking (FIT) option for field data collection with wireless updates. The application con-

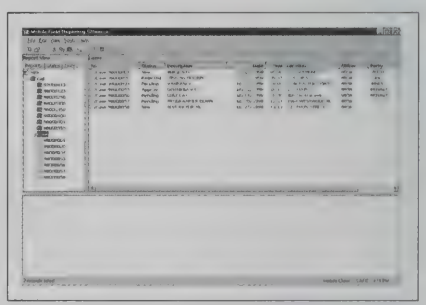
nects wirelessly to the company's LAN-based administration and reporting module for analysis and publication of reports. The field reporting module addresses requirements associated with compliance to racial profiling legislation. Navigation reduces the time it takes for an officer to enter a request or send a message. Visit www.aethersystems.com/mobilegov. ***Circle #111***

FDM Software

FDM Software offers map-integrated records management and CAD solutions for public safety professionals and emergency responders. The records management system (RMS) is now wireless and Internet-enabled with the recent completion of the Internet eBizServer. The eBizServer enables internal and field database requests to be processed at the server through multiple dynamically pooled open database connectivity (ODBC) connections. The client application installed on the workstation requires TCP/IP access to the server, which can be through a dial-up Internet connection, wireless CDPD connection, narrow bandwidth WAN connection such as ISDN or 56 KB, or standard and regular WAN/LAN connections. The eBizServer also reduces WAN traffic and improves database performance by caching pick lists, forms, and other static data. Visit www.fdmsoft.com. ***Circle #112***

Hitech Systems

The SafetyNet mobile field reporting tool is designed to reduce the amount of paperwork found in law enforcement offices. The product automates the hand-



written field reporting process allowing officers to spend less time on administrative tasks. It also enables officers to write a report from the field or in their office. Software features include data call-up and access; data sharing across a system; and validation of data accuracy and consistency. It is integrated with SafetyNet CAD and SafetyNet RMS. ***Circle #113***

Imagis Technologies

The company's computerized arrest and bookings system (CABS) software is designed for police mobile patrol usage. CABS Cruiser puts all offender information,

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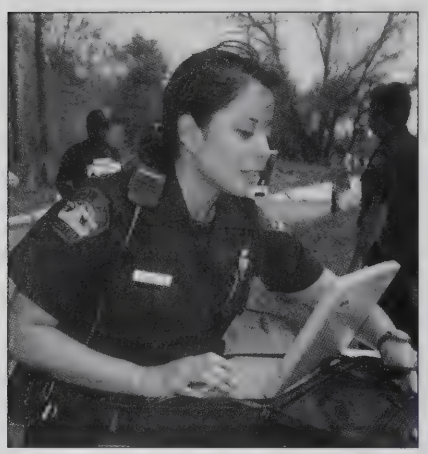
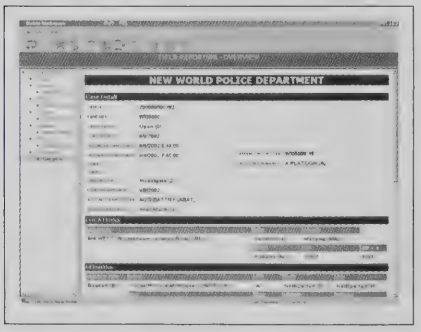


including thumbnail images, right in the police cruiser. A wireless connection allows access to quick, real-time searches to create suspect lists while the officer is still at the crime scene. These reports and photos can also be used for intelligence gathering to solve crimes faster. CABS Cruiser can be used from anywhere and is capable of accessing local and regional databases to provide transactions, queries, and reports. A true client-server configuration allows even small departments to perform intuitive searches for criminal analysis, suspect lineups, and ongoing investigations. Visit www.imagistechnologies.com. ***Circle #114***

New World Systems

Aegis mobile computing software includes CAD, records, corrections, and mobile computing. It is fully integrated, allowing



officers to obtain critical, accurate, and real-time information from any application. When mobile computing is used in conjunction with the CAD and records functions, officers can attain information while in the field and save time by preparing incident and accident reports in the car. The user-friendly software includes Windows features such as pull-down menus, toolbars, and point-and-click capabilities. Touch screen monitors provide methods of obtaining critical information without jeopardizing the safety of the officer driving the vehicle. Visit www.newworldsystems.com. ***Circle #115***

Open Software Solutions Inc. (OSSI)

The visual mobile application allows field personnel to access information such as local, state, and national warrant checks; Department of Motor Vehicle (DMV) inquiries; stolen vehicle and property

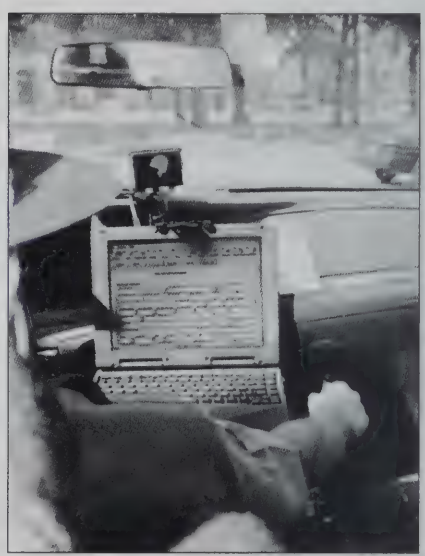
information; mugshots; and records management information in their vehicles. The product allows officers to complete and submit their reports for supervisory review while remaining on the beat. It also features AVL and speech synthesis support, and a driver's license magnetic strip reader interface. Visit www.ossiusa.com. ***Circle #116***

Positron Public Safety Systems

Power MIS-Remote Reporting is a Web-based system that can run on small mobile devices such as a Palm Pilot, iPAQ handheld, and others. Using a wireless connection (wireless network card or cellular card), users can stay connected with the PSAP from anywhere and at anytime. The product offers four different views of the desired data: summary, list, detail, and mapping representation. The summary provides a snapshot of current and recent PSAP activity in terms of call taking, incident, and dispatching (responses and handling units). It can analyze a situation by searching for a specific event in the list browser. All important attributes can be viewed in a detailed layout, or the location of an event can be displayed on a mapping viewer. Search and query capabilities enable users to retrieve information corresponding to specific criteria. Current and historical information is displayed according to the same basic four views. ***Circle #117***

Printrak

Premier MDC Reporting enables public safety personnel in the field to quickly create reports. Data can be collected through customized forms, definable supervisor workflow processes, and exporting of report data from the records management system (RMS). Because users create and submit reports wirelessly, they are able to remain in their vehicles. The product offers efficient report collection by providing agencies with customized electronic reports, allowing for the use of pull-down menus, as well as the validation, linking, and importing of data. This method requires minimal training and

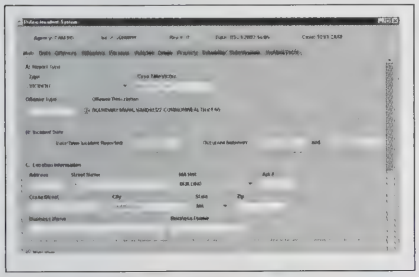


support for users, while complying with local, state, and federal reporting standards. Data gathered from completed reports is available for export into an RMS. Agencies can improve report accuracy and eliminate retyping by directly importing dispatch, state, RMS, or barcode data. Customized lists and validations help verify valid data and ensure that complete reports are submitted. Configurable workflow allows reports to be sent through wireless transmissions

directly from a vehicle or desktop workstation for approval. In the absence of an individual supervisor, users can submit reports to a group of supervisors. The product also accommodates assigned shifts, locations, or departments, enabling faster response times. ***Circle #118***

Q.E.D.

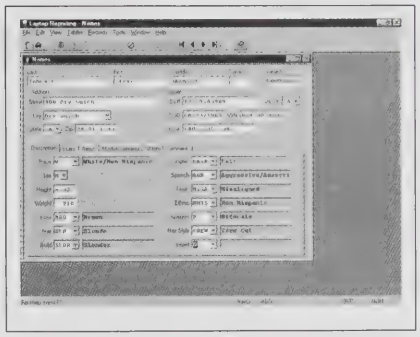
CrimeWeb is an integrated software application for capturing, managing, and analyzing uniform crime reporting (UCR) or national incident-based reporting (NIBRS) incidents through a common, familiar Web interface. The incident reporting system feature is designed for use in mobile units using CDPD and Internet Explorer.



Reports can be entered, reviewed, updated, and browsed in real time, and supervisors have the ability to reject reports and send them back to the user for clarification. Full application security dictates the capabilities of each user and provides hyperlinks to other records management system (RMS) modules. Hyperlinks direct the user from a CAD incident to the police report to the arrest history to the booking sheet (with images) with just a few clicks. The product also allows officers to view incident reports they are responsible for, as well as allowing shift supervisors to view and manage all reports due for the shift. Visit www.qed.com. ***Circle #119***

Spillman Technologies

The company's field reporting product allows users to record and transfer field reports and information from a notebook computer to the main server. Some of the features include data entry, data transfer, supervisory review of records, user tools, and optional full emulation. The module



enables officers in the field to record information on a notebook computer. Field records can be easily transferred to the company's main system, allowing for easy, long-term storage. Supervisory review of records ensures the recording of accurate, agency-approved reports and data. The optional full-emulation enhancement allows officers to perform real-time inquiries and submissions. Visit www.spillman.com ***Circle #120***

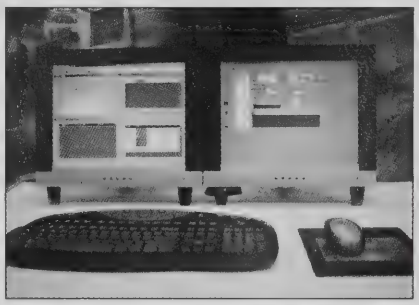
Technology Alternatives

Police and other public safety and health officials can capture and share multimedia

See Us at APCO CIRCLE #74

TECH TOOLS

electronic data including digital video, photos, audio, graphics, and text through a new compound-document management system (CDMS). The product, built on an open system architecture, incorporates a digital video recording system, a ruggedized tablet-style personal computer from Xplore Technologies, a handheld scanner, document management software for remote and office-based PCs, and various options for data communications including a modem that supports 802.11b wireless data transmission. The software is compatible with many relational database software systems, enabling most police departments to continue using the database systems they already have installed. Visit www.techalt.com. ***Circle # 121***

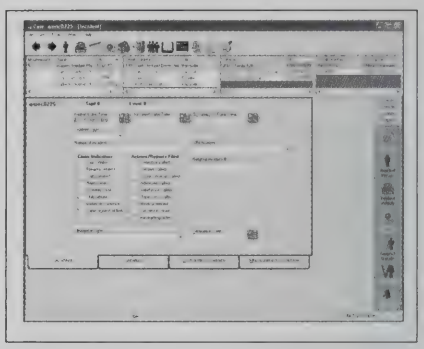


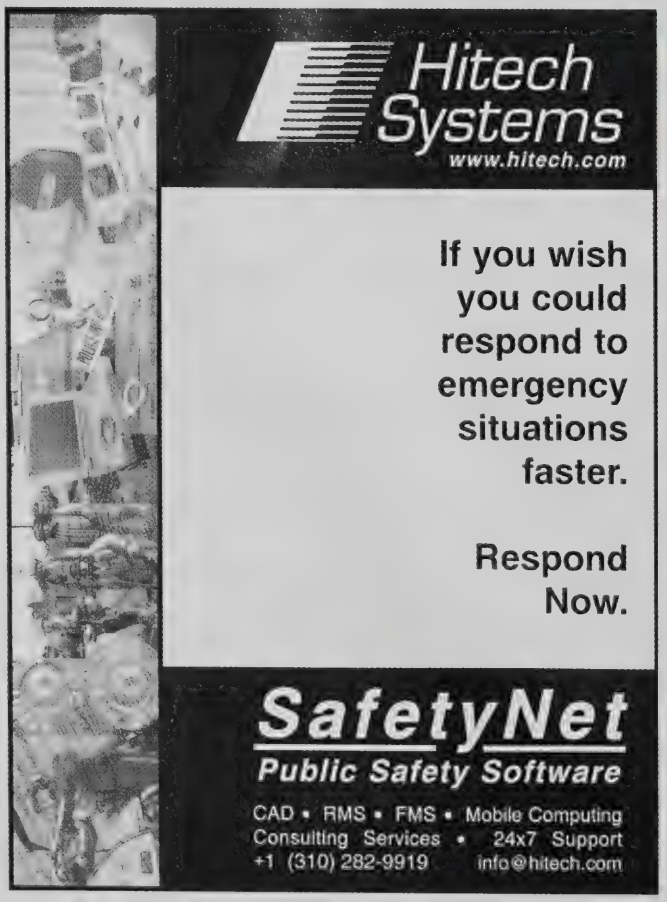
Valor Systems

The ValorRMS records management system (RMS) enables public safety agencies to implement a new system without having to restructure their operations and procedures. Similar to ValorCAD, the product is scaleable and configurable to meet the operational needs of agencies of all sizes. Built on the Microsoft platform, it incorporates a familiar graphical user interface (GUI) that allows reports to be easily processed and completed. As each CAD event is completed and closed, specific details are transferred automatically into ValorRMS. Visit www.valorsystems.com. ***Circle #122***

Viking Technology

PEC Solution's field reporting software (FRS) application incorporates a records management system (RMS) that the user can also use on a desktop computer. The enterprise information system (EIS) responds to the needs of the entire organization: investigation, property and evidence, and personnel and training. The system, which can be tailored to meet an agency's unique requirements, was designed using Microsoft's 2000/XP graphical user interface (GUI). EIS supports either a structured query language (SQL) server or Oracle database. EIS has different versions for law enforcement and fire/EMS. ***Circle #123***





See Us at APCO CIRCLE #75

CIRCLE #76

BUSINESS

Baltimore Unveils New Mobile Command Post

Baltimore's mayor and police commissioner introduced the city to its newest crime-fighting tool: a 45-foot long, 13-foot tall mobile command post. The 2002 MT-55 Freightliner truck is equipped with state-of-the-art crime-fighting technology including a communications system that allows the Baltimore PD to interface with other local law enforcement agencies as well as federal agencies. The command post is equipped with external cameras for surveillance and a microwave downlink that can be used to track "Foxtrot," the PD's helicopter.

Funds for the $900,000 vehicle were generated with help from the private sector via the Baltimore Police Foundation and federal and state grants. Local Baltimore advertising agency The Campbell Group donated the creative work for the design on the mobile command post.

"The command vehicle will be instrumental and extremely beneficial to crime fighting," Police Commissioner Edward Norris said. "It will provide technological support to our officers in the field."

Shared Public Safety System Goes Online

Lake County (Ohio) implemented a radio system that provides interoperability among the county's public safety agencies including police and fire departments and public service agencies. "By sharing a common system, we are better able to coordinate our response in emergency situations," said David Loomis, assistant director of telecommunications for Lake County. "The efficiency of communications, particularly at the site of the area's nuclear electrical generation plant, saves time, and that, in turn, can save lives."

The $7.8 million simulcast system, provided by Motorola, is capable of operating in digital or analog mode and is installed at four sites with 13 channels available for voice communications. It will first be used by 40 public safety agencies in Lake County, with 25 public service agencies to be added to the system in the near future. The system is also interoperable with a Motorola system in neighboring Geauga County. Funding for the system was in large part provided by First Energy Corp., the local nuclear electrical generation plant, and county transit agency Laketran.

Openwave Systems to Acquire SignalSoft

Openwave Systems announced its intentions to acquire SignalSoft for approximately $59 million in cash. Openwave will pay $2.26 for each outstanding share of SignalSoft's common stock, using SignalSoft's existing $45 million cash on hand to help finance the transaction. Openwave is primarily interested in SignalSoft's location information software for commercial and E9-1-1 services. SignalSoft's Wireless Location Services suite enables consumers to receive information and content via a mobile phone and provides public safety answering points with the location information of callers in an emergency. Openwave will integrate these location capabilities with its mobile Internet and messaging applications.

Satellite Technology Provider Launches Federal Division

Tachyon Inc. announced that it will be focusing on government and military applications with the launch of its new Washington, D.C.-based Federal Systems Division. The broadband satellite infrastructure and service provider said it will target U.S. agencies and other government institutions with its signal processing technology that enables high-speed wireless network access in remote locations. Tachyon has satellite capacity covering North America, Europe, and parts of Northern Africa and the Middle East.

Chester County to Expand Radio System

Officials from Chester County (Pa.) announced the county is expanding its 800 MHz simulcast radio communications system, adding five channels to each of its 17 tower sites. The Multi-Net II radio system from EFJohnson serves 120 agencies in the county just west of Philadelphia. The value of the project is approximately $3.1 million.

Radio Donation Program a Success

Following the Sept. 11 attacks, radio systems manufacturer Vertex Standard launched a program for its dealers designed to make donated radios available to rescue workers in New York. Dubbed "Radios to the Rescue," the program has already generated more than 400 VX-series portable radios, as well as batteries, chargers, and other accessories totaling more than $225,000. Receiving the equipment were the American Red Cross of Northeastern New York, the American Red Cross Disaster Communications division, and the New York State Urban Technical Search and Response agency.

"[The gift] was indicative of the special and necessary assistance from the community, which is vital in order for the Red Cross to continue providing its life-saving assistance," said Nanci Conley, development and communications director of the Northeastern New York Chapter of the American Red Cross.

Missouri Radio Network Completed

The city of Springfield and Greene County (Mo.) completed installation of an $18.5 million, 800 MHz Motorola Astro

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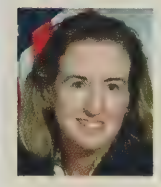
SmartZone trunked digital communications system. The seven-site, 18-channel digital communications system will be shared by various public safety and service agencies including Springfield's City Utilities, the Greene County Sheriff's Department, the Greene County Highway Department, and the Emergency Management Office. Agencies in seven other Greene County municipalities and 12 rural fire protection districts also will share the system. City Utilities purchased the system in April 2000 and has managed the installation for the city and county agencies.

"The system provides all agencies with state-of-the-art radio communications capability and enhances communications between emergency agencies," says John Twitty, City Utilities' deputy general manager. "By pooling our resources, we have been able to provide the city and county with a better communications system at a lower cost, and that savings will benefit all our citizens."

REGULATORY

Victory Calls Attention to Interoperability

Assistant Secretary of Commerce and Administrator of the National Telecommunications and Information Administration (NTIA) Nancy Victory implored the public safety industry and manufacturers of communications equipment to work more closely toward interoperable communications solutions.



"Without interoperability, our public safety community is left with a 'Tower of Babel' in which no one can understand what anyone else is saying or learn what others are doing," she said. "We therefore must redouble our efforts to create a workable plan for achieving a fully interoperable future."

Victory's comments came as part of her keynote speech during the two-day summit on interoperability hosted by the Public Safety Wireless Network (PSWN) and NTIA in Washington, D.C., in mid-June. The purpose of the summit was to educate and provide federal and state CIOs, congressional staff, county administrators, and public safety executives with technology solutions for achieving interoperability among federal, state, and local public safety entities.

According to Victory, feedback from the summit will help NTIA develop policies and strategies and advise the current administration concerning the role of technology in developing the nation's public safety communications infrastructure. "NTIA will be carefully reviewing the public safety interoperability summit record and coordinating actions based upon your recommendations with PSWN and the FCC. I also will be communicating any need for legislative actions to Congress as appropriate."

Also discussed at the summit were topics such as funding for communications systems, emerging technological solutions, and communications lessons learned from the 2002 Winter Olympics in Salt Lake City.

West Coast's First E9-1-1 Launch

The Oregon Office of Emergency Management honored Douglas County (Ore.) as the first county on the West Coast to have an operating E9-1-1 wireless location system in place. The system, developed and deployed by Airbiquity and Edge Wireless, will provide public safety dispatchers with the location information of callers that dial 9-1-1 from a wireless phone.

The launch was recognized by U.S. Senator Ron Wyden (D-Ore.), the National Emergency Number Association (NENA), and the Association of Public-Safety Communications Officials (APCO) International. "We applaud all parties involved for making E9-1-1 — our common goal — a reality on the West Coast," said Thera Bradshaw, APCO's president elect. "In addition, we are pleased that the members of the Oregon public safety community have voiced strong, bipartisan support for the deployment of E9-1-1."

CIRCLE #78

AT&T Hit With $2.2 Million Fine

The FCC has followed through on its promise to fine carriers for noncompliance with the commission's E9-1-1 Phase II implementation schedule by issuing a notice of apparent liability proposing that AT&T Wireless Services be fined $2.2 million for violating E9-1-1 Phase II rules with respect to its GSM/GPRS network.

Among other violations, the FCC says that AT&T Wireless violated the commission's rules by deploying its network without taking action toward selling or activating location-capable handsets, even though AT&T said in an April 2001 wavier request that it would be capable of providing Phase II service from the date it began deploying the network.

In addition, the FCC alleges that the company failed to implement any network or infrastructure upgrades necessary to provide Phase II service within six months of a valid request by a designated public safety answering point. In a statement, AT&T agreed to part of the fines but opposed others saying that infringements were minor and its fines should be "significantly reduced."

Cingular Wireless has also been fined by the FCC for its noncompliance with the commission's E9-1-1 deadlines. In May, Cingular, which also chose a network-based location technology, agreed to a $100,000 fine to settle with the FCC.

ASSOCIATION HIGHLIGHTS

APCO Focuses on Homeland Security

On June 5, 2002, the Association of Public-Safety Communications Officials (APCO) International hosted its first in a series of events focusing on homeland security. Held in the Reagan Trade Center in Washington, D.C., APCO played host to more than 100 representatives from the public safety and commercial sectors.

Officials from the FCC, Federal Emergency Management Agency (FEMA), National Telecommunications and Information Administration (NTIA), Office of Homeland Security, and APCO presented at the event. Congressman Curt Weldon (R-Pa.), who spoke at the event, said that the current administration as well as legislators would be looking to APCO for guidance in homeland security efforts. "As we allocate more money and change more laws, APCO will be a key player in the process — assuring us that we are taking the right steps toward a safe and secure America," he said.

Summit attendees had the opportunity to hear firsthand experiences from their counterparts in New York City and Arlington, Va. Additional sessions dealt with a wide range of critical issues including radio interoperability and location technology.

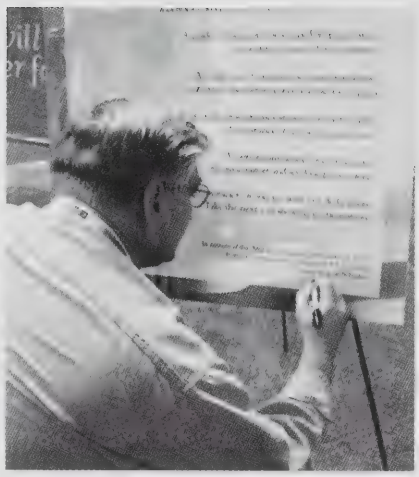
TRANSACTIONS

- **Motorola** said that Montgomery County (Pa.) will upgrade and expand its radio system to 92 fire departments, 41 police agencies, and 36 EMS squads in addition to several other government and public service agencies.
- **Motorola** also announced that the city of Jackson, Miss., has purchased its Premier MDC communications software, a wireless mobile data system that incorporates in-vehicle mapping and access to National Crime Information Center (NCIC) and local crime information databases.
- **EFJohnson** announced that the Texas Department of Public Safety will purchase its new 5100 series of radios for use with the state's VHF Project 25 digital communications system. The contract is worth close to $1 million.
- **EFJohnson** announced an agreement with the U.S. federal government to provide $1.2 million in Project 25 digital radios with handheld controllers to federal law enforcement agencies.
- The Mid-America Regional Council, responsible for public safety answering points (PSAPs) in the Kansas City, Mo., region is upgrading its 9-1-1 equipment and mapping software. Suppliers for the $7.9 million project include **CML Emergency Services**, **Commenco**, and **GeoComm**.
- Toronto's Emergency Medical Services Department will use **AvEL-TECH**'s CAD applications and message switch for onboard mapping, messaging, and field reporting.
- **Dataradio Corp.** announced that it is installing UHF mobile data radio modems and base stations for the city of Apopka, Fla., to be used by the city's police and fire departments.
- **Dataradio Corp.** recently upgraded the existing mobile data system for the city of Springfield, Mo. The upgrade boosts the city's data transmission capabilities from 9.6 kbps to 25.6 kbps in the 800 MHz frequency range.
- **Contact One**, an emergency services consultancy, has been retained by the Denver International Airport to assess the airport's current 9-1-1 system and recommend improvements to its emergency services processes.
- **Spillman Technologies** announced a contract with the Buckeye, Ariz., Police Department to install its Summit public safety and data management software.
- **Spillman Technologies** also said it is supplying BYU-Hawaii with software that will enable the BYU-Hawaii Police Department to communicate with its parent institution, Brigham Young University, in Provo, Utah.
- **Logistic Systems** announced that the city of Butte and Silver-Bow County in Montana will implement a CAD and records management system (RMS) for its police, fire, and EMS departments.
- **FDM Software** announced that it will install a 100-user fire/EMS records management system (RMS) in the city of Charlotte, N.C.

APCO's Homeland Security Task Force, headed by APCO Second Vice President Greg Ballentine, used the summit as a launching pad for a series of events related to homeland security. In addition to a white paper that will be developed by the task force, APCO has announced a town hall-format meeting to be hosted by John Sununu, former New Hampshire governor and White House chief of staff to former President George Bush, on Aug. 12, 2002, during the opening session of APCO's 68th annual conference in Nashville, Tenn. *(Special thanks to PSR board member Joe Gallelli for contributing this report.)*

NENA Conference Produces Tribute, New Board Members

A tribute and fundraiser at the National Emergency Number Association (NENA) annual conference and exhibition in Indianapolis helped raise money for the International Association of firefighters and the New York Fraternal Order of Police. Sponsored by NENA and Plant Equipment Inc., "The Spirit of 9-1-1" featured displays and artifacts linked to the Sept. 11 tragedy.



Ron Schuster, ENP, signs the poem he wrote following the Sept. 11 tragedies honoring all 9-1-1 call-takers as "unsung heros."

NENA's executive board for the 2002-2003 term was also announced at the conference. John Melcher was named president; Richard Taylor, first vice president; and Bill McMurray, second vice president.

APCO Survey Identifies Public Safety's Concerns

What is the most important factor for resolving interoperability issues so that first responders can adequately communicate in an emergency? Eighty percent of public safety professionals believe that coordination among public safety agencies is the key to interoperability, according to the Public-Safety Communications Priorities Survey recently released by the Association of Public Safety Communications Officials (APCO) International. Far fewer respondents believed that new technologies (28 percent) and additional spectrum (17 percent) were important factors to achieving interoperability.

The survey also revealed that 58 percent of the respondents believe that funding is the most important issue facing their communities, as opposed to 26 percent saying that E9-1-1 was their most pressing issue. "The industry feels that having the best and most reliable applications and services is increasingly vital,"

CIRCLE #79

CIRCLE #80

said outgoing APCO President Glen Nash. "It is clear from this survey that the public safety communications community is a critical member of the first response community and has much to contribute in developing comprehensive homeland security strategies." The survey was released following a day-long symposium on June 5 to address homeland security efforts and critical public safety communications infrastructure issues.

Incoming APCO President Switches Jobs

Thera Bradshaw, who becomes president of the Association of Public-Safety Communications Officials (APCO) International in August, has accepted a position with the city of Los Angeles to run its communications bureau. Bradshaw was the executive director for the Emergency Communications Department in San Francisco. While in San Francisco, Bradshaw was responsible for building a new department that consolidated all emergency communications for the city. She also implemented a $167 million capital improvement project, which included one of California's first successful wireless 9-1-1 implementations.

ALLIANCES

- **Motorola, Visionics,** and **Wirehound** are collaborating on a facial recognition system developed specifically for law enforcement agencies.
- **Mobile Data Solutions Inc.** (MDSI) and **Datamaxx** have entered into an agreement that grants Datamaxx exclusive rights to license MDSI's public safety products in North America.
- **BI Inc.** announced it will integrate **Digital Angel Corp.**'s GPS platform into its monitoring products. The solution will enable law enforcement to track offenders under community supervision.
- **AT&T** and **Intrado** entered into an agreement whereby Intrado will provide its IntelliBase National Repository Line Level Database for the AT&T network.
- **Verizon Wireless** inked a five-year deal with **TeleCommunications Systems** (TCS) in which TCS will provide Phase I and II wireless location services to 50 percent of Verizon's cell cites around the United States.
- **Radio IP Software Inc.** and wireless modem manufacturer **Electronic Systems Technology Inc.** have developed a strategic alliance to develop an end-to-end mobile data solution for public safety agencies.

CANADIAN NEWS

Increased Use of "Jammers" Opposed

Industry Canada released the results of a study it conducted to judge the public's interest in broadening the use of RF jamming devices, which are capable of

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CIRCLE #81

interfering with or blocking cellular, radio, or personal communications devices. Responses from 200 Canadian citizens and 30 Canadian companies and industry associations were compiled, including the Association of Public-Safety Communications Officials of Canada (APCO Canada). The majority of responders were strongly opposed to broadening the use of jamming devices.

From the results, the department concluded it would uphold its current prohibition against such devices because broadening the use of jammers could have potentially harmful effects to public safety, particularly in situations where 9-1-1 calls are placed from cellular phones, and for its potential to disrupt communications among law enforcement agencies that need to respond in an emergency. Additionally, most responders indicated that enforcement of "jamming" rules would be harder to enforce if the use of such devices were broadened.

A minority of individuals voiced support for increased availability and use of jamming devices, citing social etiquette, or a lack thereof, when cellular phones or other personal communication devices go off in public areas such as movie theaters or restaurants. No one representing theater or restaurant associations participated in the survey, however.

The issue surfaced in March 2001 when Industry Canada sought to broaden the authorized uses of jamming devices after discussions with representatives from the wireless industry and developers of jamming devices, as well as emerging public opinion, that the devices may have effective uses outside their original purpose as a tool for law enforcement and public safety agencies.

See Us at APCO CIRCLE #82

See Us at APCO CIRCLE #83

WHAT'S NEW

MOBILE MOUNTS

By Angela Langowski

Police and fire department personnel need rugged mounting equipment that can withstand the rigors of their mobile computers being used for 18 or more hours per day. Also to consider when purchasing mounting equipment is how moveable and user-friendly the mount is for different sized people; whether the vehicle requires a fix mount or portable mount; and how it will adapt to the other equipment already in the vehicle.

Please use the reader service card on page 131 if you would like more information on an item or, for faster response, go to "Reader Service" at www.radioresourcemag.com.

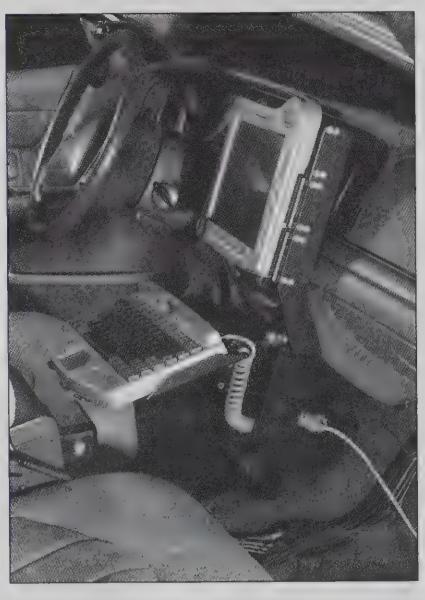
Cruisers

The company's computer dash mount for modular or pen/tablet-based computers enables users to manually release the computer monitor so it swings away, allowing access to the AM/FM radio. When the monitor/tablet is in its closed

and locked position, the driver and passenger can still view them. The heating, ventilation, and air conditioning (HVAC) controls and the trunk lid release button can still be accessed when the monitor is closed. The articulating keyboard arm is attached to the dash-mount framework, eliminating the need for a pedestal stand. All mounting and support attach to existing OEM locations, eliminating any damage to the dashboard. The mount is designed for the Ford Police Interceptor with either bucket or bench seats. Visit www.cruiserscorp.com. ***Circle #124***

Gamber-Johnson

The company's patent-pending in-dash mounting system is built for the Motorola MW520 computer and is designed to fit in 1998 or newer Ford Crown Victorias. The mount's display adjusts vertically to two positions, allowing for access to

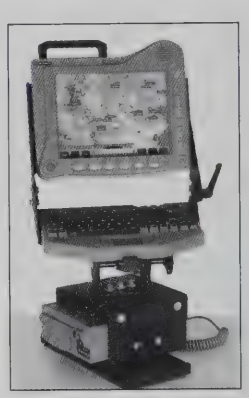


heating, ventilation, and air conditioning (HVAC) controls and unobstructed sight lines. The central processing unit (CPU) mounts under the dash, and the screen and keyboard can be offset toward the passenger side, creating more room for the driver. An MW520 pedestal system is also available. Visit www.gamberjohnson.com. ***Circle #125***

Havis-Shields

The Consolidator mount for Motorola's 520 mobile workstation includes a removable keyboard and a heavy-duty hinged monitor mount, which accommodates 350 and 1000 NIT active matrix color LCD monitors and is compatible with all existing Consolidator mounting systems. There is also a dash-mounted display version available for the Ford Crown Victoria.

The company offers an 8-inch overhead enclosed console with an 80-degree

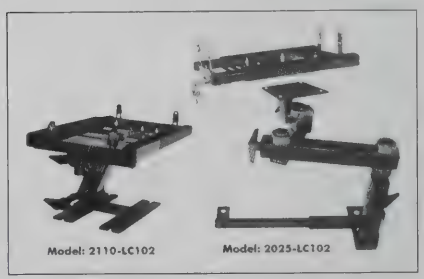


swivel mount complete with mounting hardware. It fits three pieces of equipment and radio heads or switches plus mics. The van console is up to 16 inches high and 12 or 18 inches long. It includes a belly pan enclosure and all hardware.

Other products from Havis-Shields include overhead racks for trucks and fire apparatus; an adapter mounting plate assembly for Kodiak, PCMobile, and other docking stations plus hardware; a dual mic-clip bracket for mounting two mics on a dash; and a 32-inch Trak-Mount for mounting radio and other equipment in sedans. The Trak-Mount includes front and rear transmission hump-mounting brackets. ***Circle #126***

Hint Peripherals Corp.

The 2025-LC102 twin arm system allows a driver to place a laptop computer almost anywhere between the front seats and the dashboard. It offers tilt and swivel controls under the laptop tray in addition



to a double-pivoting locking arm and a spring-loaded rising post.

The 2110-LC102 sliding-mount system allows the height to be adjusted from seven to 11.5 inches. In the extended position it can clear 10.25 inches to allow it to swing over a standard radio console. It is capable of swinging 360 degrees, and the laptop tray can slide up to 4.25 inches forward, bringing it closer to the driver. Both the vertical and sliding operations use self-lubricating nylon tracks that supply this mount with very low friction,

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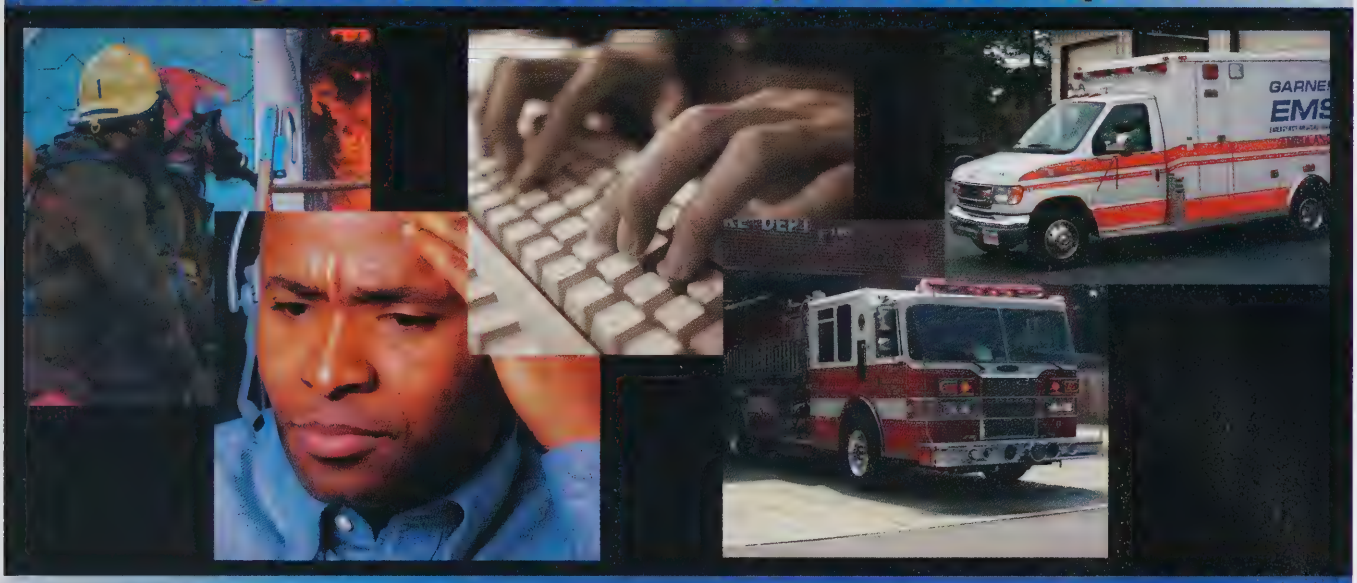

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CIRCLE #84

providing a longer operational life. It mounts on most center console racks. ***Circle# 127***

Jotto Desk

The console side mount (CSM) mounts a computer and a console into a police vehicle, combining the characteristics of the contour console equipment and the

company's computer mounts into one mounting solution. The CSM is designed to mount notebook computers or two-piece monitor/keyboard computing systems without removing the factory radio. The product optimizes vehicle space through vertical, forward mounting of the console and the computer mount, placing all communications equipment forward and between the seats against the vehicle dashboard. The product enables the monitor to fold down 90 degrees, rotate 180 degrees on the pivot arm, and swivel in place 360 degrees. The keyboard arm pulls over for comfortable operation and pushes away for locked storage. It includes a no-hole installation with the key components installed at the factory. Visit www.jottodesk.com. ***Circle #128***

L&E Mobile Computers & Mounts

The LE-MIII-Dock and the LE-Pan-MIII-D are designed for and approved by Panasonic to accompany the newly reconfigured CF-M34N and CF-34N Mark III Panasonic Toughbook permanent display removable computers (PDRC). The LE-MIII includes an L&E board and accommodates four COM ports (two dedicated and two router), four USB ports, and all

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CIRCLE #85

WHEN PRODUCTIVITY COUNTS

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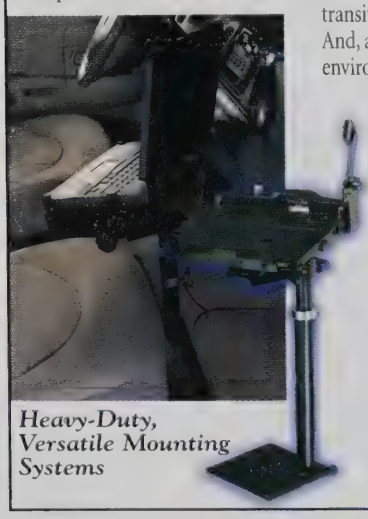

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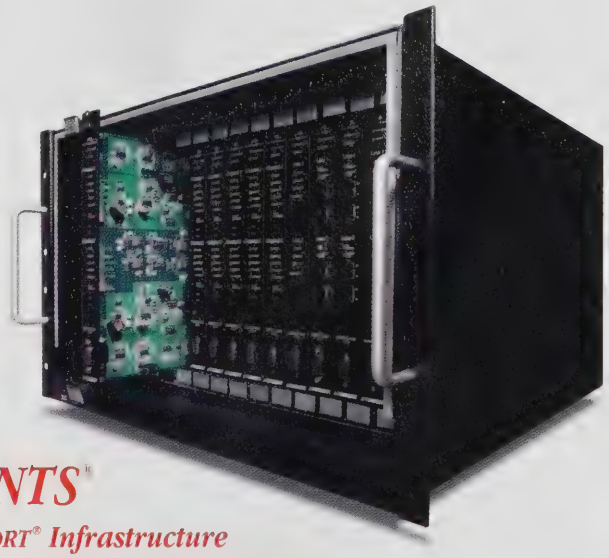

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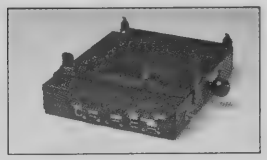
CIRCLE #87

WHAT'S NEW



other PDRC connections. The LE-Pan includes an L&E dock and a Panasonic board with two dedicated COM ports, two USB ports, and all other PDRC connections. Visit www.lemobilemounts.com. ***Circle #129***

Lund Industries

The FCV-CSM multiplatform, in-dash mount is built for 1997 to 2003 Ford Crown Victorias. It mounts in place of the factory AM/FM radio and allows Xplore

GII, Motorola MW-520, and Panasonic permanent display removable computers (PDRC) to be mounted on the dash, enabling easy access to touch screens and other functions. The unit tilts for easy viewing under high ambient light conditions. The FCV-RRL radio relocator bracket repositions the factory radio under the dash and includes cutouts for trunk release and power in the side. ***Circle #130***

Revolve Design

The PowerUniMount and RoadWriter feature in-vehicle handheld charging; an integrated touch-type keyboard (optimized for the handheld computer); and on-board serial ports for connectivity to

GPS receivers, modems, cell phones, and printers. The products enable a secure, accessible placement of the handheld computer in a vehicle, while providing for continuous usage when paired with a GPS receiver or with a modem for two-way wireless communication. The handheld can be installed and removed quickly from the UniMount with the touch of a button. Visit www.revolvedesign.com. ***Circle #131***

Scientific Dimensions

The Phoenix 7510 console mount includes computer tilt swivel, an armrest, a three-plug power adapter, and a 12-position fuse block. The product features

anchor feet solutions for the Ford Crown Victoria, Explorer, Expedition, and F250; the Chevrolet Impala, Suburban, and Tahoe; and

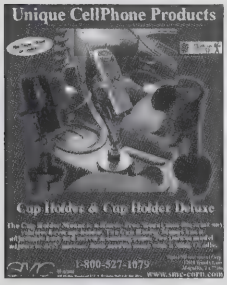
CIRCLE #88

CIRCLE #89

the Dodge Intrepid and Durango. It has four mounting zones with an armrest; a computer tower and console that can be adjusted separately for ergonomics and safety; a console that hinges open for quick access to radios or control heads; and a separate fuse panel access door. It includes turn fasteners on all faceplates and ventilation slots to prevent overheating. Visit www.sdi.cc. ***Circle #132***

Signal Measurement Corp.

The cup holder mount is a hands-free



mount that fits into almost any vehicle beverage holder. The product has an adjustable base and swivel mounting plate. The deluxe model adjusts to any position. Both models come with a mini cradle. Visit www.smc-corp.com. ***Circle #133***

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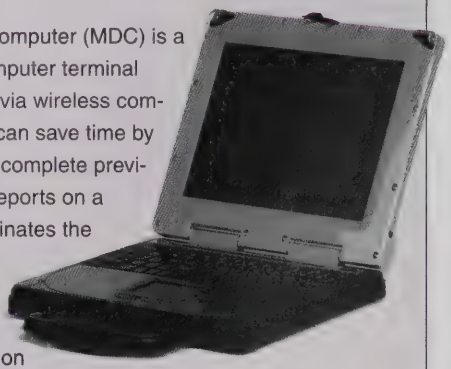
See Us at APCO CIRCLE #91

Mobile Data Computers

By Angela Langowski



A mobile data computer (MDC) is a in-vehicle computer terminal linked to a network via wireless communication. MDCs can save time by enabling officers to complete previously handwritten reports on a computer. This eliminates the need to enter duplicate information on single or multiple reports, depending on the type of call, incident, and response. Electronically produced reports also allow supervisors to review the reports more quickly, and any necessary changes are easier to complete. Among other functions, MDCs can also save time through e-mail, in-field mug shots, and digital field lineups. On the following pages you will find specs for a variety of MDCs. If you would like more information on an item, please circle the appropriate number on the reader service card on page 131 or, for faster response, go to "Reader Service" at www.radioresourcemag.com. ■

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↓SPECS								
Dimensions (WxDxH)	12.3 x 9.7 x 2.5 in.	12.3 x 9.7 x 2.3 in.	12.3 x 9.7 x 2.5 in.	11.375 x 10.625 x 3.25 in.	3.54 x 9.77 x 1.54 in.	3.54 x 9.77 x 1.54 in.	3.54 x 9.77 x 1.54 in.	11.9 x 9.4 x 2 in.
System weight	10.8 lbs.	7 lbs.	10.8 lbs.(when used as a notebook)	10.6 lbs.	1.8 lbs.	1.9 lbs.	1.9 lbs.	8.6 lbs.
Physical description	Rugged notebook	Rugged 3-piece fixed in-vehicle solution	Rugged notebook, 3-piece fixed solution	Rugged mobile computer	Large display, rubber keyboard, corner prot.	Large display, rubber keyboard, corner prot.	Large display, rubber keyboard, corner prot.	Three-component solution
Construction materials	Magnesium case	Magnesium case	Magnesium case	Magnesium casing	Plastic case/rubber key	Plastic case/rubber key	Plastic case/rubber key	Cast aluminum
Meets which military specs?	Mil-Std-810F	Mil-Std-810F	Mil-Std-810F	Mil-Std-810E	Mil-Std-810E	Mil-Std-810E	Mil-Std-810E	--
Vibration specs	Mil-Std-810F method 514.5C, 5-500 Hz,	Mil-Std-810F method 514.5C, 5-500 Hz	Mil-Std-810F method 514.5C, 5-500 Hz	Mil-Std-810F, 514.5 Cat 4, 5, 24 opt.	No	No	No	--
Processor	PIII	PIII	PIII	Low-power PIII	386 processor	Intel, StrongARM, SA1110	Intel, StrongARM, SA1110	PIII
Processor speed	800 MHz; upgrade to 900	800 MHz; upgrade to 900	800 MHz; upgrade to 900	500 MHz	25/33 MHz	206 MHz	206 MHz	700 MHz
Laptop	Yes	No	Yes	Yes	No	No	No	No
Stationary in-vehicle	No	Yes	Yes and laptop	Yes	Yes	Yes	Yes	Yes
Stationary	No	Yes	Yes and laptop	Yes	No	No	No	No
Handheld	No	No	No	No	Yes	Yes	Yes	No
Mountable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tablet	No	No	No	No	No	No	No	No
Display	XGA - TFT LCD	XGA - TFT LCD	XGA - TFT LCD	SVGA	CGA	LCD	LCD	SVGA
Std. display size	12.1 in.	12.1 in.	12.1 in.	10.4 in.	200 x 200 pixels	240 x 320 pixels	320 x 240 pixels	800 x 600 SVGA
Opt. display size	13.3 in.	13.3 in.	13.3 in.	N/A	No	No	No	--
Display backlit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sunlight-visible displays	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Operating system	Windows 95/98/2000 or NT	Windows 95/98/2000 or NT	Windows 95/98/2000 or NT	Windows 98/2000/NT	MS-DOS	Windows CE	Windows CE	Windows 98, 2000, XP
Message memory available(std./max.)	128 MB SDRAM or 512 MB opt. expansion	128 MB SDRAM or 512 MB opt. expansion	128 MB SDRAM or 512 MB opt. expansion	64 MB std.	8/16 MB dynamic memory	16/32 MB	16/32 MB	128 MB std., 256 max.
Floppy drive description	Yes	Yes	Yes	External	No	No	No	Opt.
Floppy/CD-ROM combo	Yes	Yes	Yes	Yes, through docking	No	No	No	Opt.
Ports:								
Serial	2	2	2	Yes	--	--	--	Yes
PS/2	1	1	1	Yes	--	--	--	Yes
Parallel	1	1	1	Yes	--	--	--	--
USB	1	1	1	Yes	--	--	--	2
Fire wire	No	No	No	No	--	--	--	--
Keyboard:								
Detached or integrated	Integrated	Integrated	Integrated	Detachable	integrated	Integrated	Integrated	Fixed or detached
Size	89-key std. backlit	89-key std. backlit	89-key std. backlit	89-key std.	51 multikeys	54 multikeys	54 multikeys	82-key backlit
Water-resistant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of user-programmable keys	N/A	N/A	N/A	12	15	15	15	--
Operating current	19 V	19 V	19 V	2.35 A @ 12 V	12 DC 2 A	12 DC 2 A	12 DC 2 A	--
Operating temperature	0° to +45° C	0° to +45° C	0° to +45° C	0° to +60° C	-30° to +50° C	-20° to +50° C	-20° to +50° C	0° to +50° C
Power supply	Battery/veh./AC adapter	Battery/veh./AC adapter	Battery/veh./AC adapter	Vehicle/battery/AC-DC	12 DC 2A	12 DC 2A	12 DC 2A	Veh. USB hub
Battery type	Li-ion	Li-ion	Li-ion	NiCd	Li-ion	Li-ion	Li-ion	--
Battery life	2.5 hours	2.5 hours	2.5 hours	1 hour	2 @ 3 days	2 @ 3 days	2 @ 3 days	--
Standard modem type	No	No	No	Yes Sierra Wireless	No --	No --	No --	-- --
Communication capabilities	56.6K int. fax modem	56.6K int. fax modem	56.6K int. fax modem	CDPD/RF switch/LAN	CDPD/LAN/WLAN	CDPD/LAN/WLAN	CDPD/LAN/WLAN	Ethernet, LAN
Incoming message indicator	Software	Software	Software	Depends on software	No	No	No	--
Forms creation capability	Software	Software	Software	Depends on software	No	No	No	--
Peripheral interfaces	PCMCIA, docking, USB, opt. CD-ROM	PCMCIA, docking, USB, opt. CD-ROM	PCMCIA, docking, USB, opt. CD-ROM	CD-ROM, floppy, bar-code, mag. stripe	PCMCIA 2 type I or 2 type III	PCMCIA 2 type I or 2 type III	PCMCIA 2 type I or 2 type III	--
Soft keys	Yes	Yes	Yes	Yes	Yes	Yes	Yes	--
Rugged data input devices If yes, type?	Backlit keyboard	Backlit keyboard	Backlit keyboard	Backlit keyboard, static mouse	Yes --	Yes --	Yes --	-- --
Voice group dispatch	N/A	N/A	N/A	N/A	Yes, opt.	Yes, integrated	Yes, integrated	--
Network options	Yes, wireless LAN/WAN	Yes, wireless LAN/WAN	Yes, wireless LAN/WAN	Wireless LAN/CDPD	No	No	No	--
Field programmable	Yes	Yes	Yes	Yes	No	No	No	--
Other field service capabilities	Swappable components HDD/FDD/CD-ROM/ CDRW/ DVD, 2ndary battery	Swappable components HDD/FDD/CD-ROM/ CDRW/ DVD, 2ndary battery	Swappable components HDD/FDD/CD-ROM/ CDRW/ DVD, 2ndary battery	In-vehicle/out	With VARs software	With VARs software	With VARs software	--
Over-the-air security/ network encryption	--	--	--	Yes/encryption RC4	No/No	No/No	No/No	--
Supports what GPS	ANXIM	ANXIM	ANXIM	Yes	N/A	Teletype GPS	Teletype GPS	--
Water resistant/waterproof	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mounting options	Docking station compatible with most mounting options	Docking station compatible with most mounting options	Docking station compatible with most mounting options	L&E; Troy; Stewart	UC 840	UC 840	UC 840	L-shaped steelbar biased into veh. dash using seat bolts
List software bundles avail.	N/A	N/A	N/A	N/A	No	Std. Windows CE	Std. Windows CE	--
Is a software developers' kit available?	No	No	No	N/A	No	Embedded visual tools; 3.0 EVB; EVC++	Embedded visual tools; 3.0 EVB; EVC++	--
Applications markets	Public safety, govt., military, utility, telecom	Public safety, govt., military, utility, telecom	Public safety, govt., military, utility, telecom	Security, public safety, trans., field service	Agriculture; field svc.; government; military	Agriculture; field svc.; government; military	Agriculture; field svc.; government; military	--
Warranty	3 years	3 years	3 years	3 years std.; more opt.	1 year	1 year	1 year	3 years std.
Accessories	Touchscreen, Alpha-Star sunlight LCD, dockunders, 2ndary hard drive, wireless/ wired comm. opt. battery charger, 2ndary battery, GPS receiver	Touchscreen, Alpha-Star sunlight LCD, dockunders, 2ndary hard drive, wireless/ wired comm. opt. battery charger, 2ndary battery, GPS receiver	Touchscreen, Alpha-Star sunlight LCD, dockunders, 2ndary hard drive, wireless/ wired comm. opt. battery charger, 2ndary battery, GPS receiver	AC/DC power; back-pack floppy; micro drive kit; PCMCIA card; Ethernet 10/100 LAN card	Shoulder strap; PCM-CIA door; Windows; carrying case; Li-ion battery pack	Windows, carrying case, shoulder strap	Windows, carrying case, shoulder strap	USB accessories: floppy drive, CD-ROM, mouse, card, barcode reader, printer

Key: N/A means not applicable. -- means information was not supplied. Dimensions may be rounded off.

MANUFACTURER→	*Data911*	*Datron*	*Datron*	*Datron*	*DriverTech*	*Itronix*	*Itronix*	*Kontron*
PRODUCT→	Data911 Mobile Data System	DT9400	DT5300	DT110	Truck-PC DT-2000	Itronix GoBook MAX	Itronix GoBook	EnVoy server/ display/keyboard
↓SPECS								
Dimensions (WxDxH)	Dis.: 11 x 9.6 x 1.5in; CPU: 2.5 x 5.7 x 12.5 in.; key.: 12 x 6 x 2 in.	12.2 x 10 x 2.6 in.	12.2 x 10 x 3.9 in.	12.2 x 10 x 3.9 in.	8.6 x 6.5 x 2.9 in.	12 x 9.8 x 2.2 in.	11 x 8.75 x 2.15 in.	Serv.: 5 x 13 x 4.25 in. Dis.: 11.5 x 2.5 x 9 in. Key: 11.25 x 6.25 x 1.8 in.
System weight	Dis.:5 lbs.; CPU: 3.5 lbs.; keyboard: 2 lbs.	10.78 lbs.	16 lbs.	16 lbs.	--	7.8 lbs.	6.2 lbs.	10/7/2 lbs.
Physical description	Display, CPU, key-board, power supply	--	--	--	Self-contained w/GPS receiver, CDPD modem	Rugged 2-spindle notebook computer	Ultra-rugged single spin-dle notebook comp.	Server, display, keybd.
Construction materials	Heavy-gauge aluminum	Sealed magnesium alloy, die cast	Sealed magnesium alloy, die cast	Sealed magnesium alloy, die cast	Engineering resin	Die cast magnesium	Die cast magnesium	Alum./alum./plastic
Meets which military specs?	EIA 204; RS-374	Mil-Std-810, Mil-Std-461	Mil-Std-810, Mil-Std-461	Mil-Std-810, Mil-Std-461	Yes	Mil-Std-810F	Exceeds Mil-Std-810F	Mil-Std-810E
Vibration specs	EIA 204; RS-374	Mil-Std- 810, method 514.4	Mil-Std-810, method 514.4	Mil-Std-810, method 514.4	4 g peak, 100-1100 Hz	Mil-Std-810E 514.41	Mil-Std-810E 514.41	Mil-Std-810E, 514.2
Processor	PIII	Pentium class	Pentium class	Pentium class	NEC 4121 Micro.	PIII or Celeron opt.	PIII	PIII/N/A/N/A
Processor speed	500 MHz, 700MHz	750 MHz	750 MHz	750 MHz	130 MHz	850 MHz	700 MHz	500 MHz/N/A/N/A
Laptop	No	Yes	Yes	Yes	No	Yes	Yes	No/No/No
Stationary in-vehicle	Yes	Has mobile mount	Has mobile mount	Has mobile mount	Yes	No	No	Yes/Yes/Yes
Stationary	Yes	Yes	Yes	Yes	Yes	No	No	Yes/Yes/Yes, remov.
Handheld	No	No	No	No	No	No	No	No/No/Yes
Mountable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes/Yes/Yes
Tablet	No	--	--	--		No	No	No/No/No
Display	SVGA	Active matrix TFT, SVGA	Active matrix TFT SVGA	Active matrix TFT SVGA	640 x 480, LCD	SVGA	SVGA	SVGA/SVGA/N/A
Std. display size	12.1 in	12.2 in.	12.2 in.	12.2 in.	--	12.1 in.	10.4 in	10.4 in./10.4/N/A
Opt. display size	8.4 in	--	--	--	--	N/A	NA	RGB mon./RGB mon./N/A
Display backlit	Yes	No	No	No	Yes	Yes	Yes	Yes/Yes/Yes
Sunlight-visible displays	Yes, 1300 NIT	Yes	Yes	Yes	Yes	Yes	Yes	Yes/Yes/N/A
Operating system	Windows 98, 2000	Windows 98	Windows 98	Windows 98	Windows CE, V. 2.11	Windows 98 or 2000	Windows 98 or 2000	Win, Linux/N/A/N/A
Message memory available(std./max.)	Limited to aval. HD space:10 GB	64MB; 256MB	64MB; 256MB	64MB; 256MB	DRAM, 16-32 MB	--	--	128 MB std./N/A/N/A
Floppy drive description	Yes, external	Yes	Yes	Yes	No	Yes in media bay option	USB or PC card ext. drive	Module/N/A/N/A
Floppy/CD-ROM combo	No	Yes	Yes	Yes	No	No	No	Yes/N/A/N/A
Ports:								
Serial	3	Yes	Yes	Yes	--	Yes	Yes	3/N/A/N/A
PS/2	2	Yes	Yes	Yes	--	Yes	No	Yes/N/A/N/A
Parallel	1	Yes	Yes	Yes	--	Yes	No	1 N/A/N/A
USB	2	--	--	--	--	2	2	2/N/A/N/A
Fire wire	2	--	--	--	--	No	No	No/N/A/N/A
Keyboard:								
Detached or integrated	Detached	Integrated	Integrated	Integrated	--	Integrated	Integrated	Det./N/A/Det.
Size	82 key	Std. 89	Std. 89	Std. 89	--	87-key full touch	81-key full touch	86/N/A/86
Water-resistant	Yes	Yes	Yes	Yes	Yes	IP 54	IP 65	Sealed/sealed/NEMA 4 IP56
# of user-programmable keys	12 F-keys	--	--	--	--	All	All	12/8/12
Operating current	6-18 VDC input	--	--	--	9-16, 18-32 VDC	2.25 A	2.25 A	1.5 amp/1.8-2.0 amp/N/A
Operating temperature	-22° to +158° F	0° to + 50° C	0° to + 50° C	0° to + 50° C	-20° to + 60° C	-10° to +140° F	-22 °to 140 °F	-15 °to 60° heater pckg. for all
Power supply	Switching vehicle P/S	Battery; external	External battery	External battery	Vehicle	AC, veh. adapter (12/ 24V), veh. cradle	AC, veh. adapter (12/24V), veh. cradle	All 12 V vehicle
Battery type	N/A	NiMH	NiMH	NiMH	--	Li-ion	Li-ion	N/A
Battery life	N/A	--	--	--	--	ZD bench mark 4 hrs.	ZD bench mark 4 hrs.	N/A
Standard modem type	N/A	No	Yes; Datron propri-etary modem	Yes; Mil-Std-110A/B modem	Yes; landline	Yes, V.90 56 kbps	Yes, V.90 56 kbps	N/A --
Communication capabilities	PCMCIA/Ethernet, external serial, USB	--	3000 bps over HF radio	9600 bps over HF radio	56k modem/CDPD/ LAN/GPS	56 kbps modem, Ethernet integrated, CDPD, 802.11b	56 kbps modem, Ethernet integrated, CDPD, 802.11b	Serial, USB, PCMCIA/N/A/N/A
Incoming message indicator	Software only	Yes	Yes	Yes	Yes	Yes, LED and audio.	Yes, LED and audio.	W/SW/W/SW/N/A
Forms creation capability	Software only	--	--	--	--	Touch screen standard	Touch screen standard	W/SW/N/A/N/A
Peripheral interfaces	--	--	--	--	PCMCIA support	Serial, USB, PCMCIA	Serial, USB, PCMCIA	USB/N/A/DB-9
Soft keys	--	--	--	--	Yes	--	--	Yes all 3
Rugged data input devices	Yes	--	--	--	--	Yes	Yes	USB drives/N/A/N/A
If yes, type?	Fingerprint, mag stripe, barcode	--	--	--	--	Touch screen	Touch screen	
Voice group dispatch	N/A	--	--	--	Yes	--	--	All with software
Network options	10/100 Ethernet	--	--	--	SAE J1708/J1939	T 10/100 Ethernet	T 10/100 Ethernet	Any avail./N/A/N/A
Field programmable	Yes	Yes	Yes	Yes	--	Yes, appl. dep.	Yes, appl. dep.	W/SW
Other field service capabilities	Utilities, long-haul trucking	--	--	--	--	--	--	Rem. HDD/N/A/N/A
Over-the-air security/ network encryption	Network dependent	Not built in	Not built in	Not built in	--	--	--	W/SW for all 3
Supports what GPS	All devices	--	--	--	3 appl.	External, Sierra booster	External, Sierra booster	All makes N/A
Water resistant/waterproof	Water resistant	Yes	Yes	Yes	Yes	IP 54	IP 67	Sealed/sealed/NEMA 4 IP56
Mounting options	In-dash, trunk, pedestal	--	--	--	Adj. bracket base	Veh. cradle horizontal or vertical	Veh. cradle horizontal or vertical	All Gamber, Ledco REO
List software bundles avail.	No	--	--	--	--	Custom gold disk images	Custom gold disk images	None from KMC/N/A/N/A
Is a software developers' kit available?	No	--	--	--	--	No	No	N/A
Applications markets	Police, fire, EMS, utility	--	--	--	--	Mobile field workers - all markets	Mobile field workers - all markets	Public safety, military, utility
Warranty	1 year std.	1 year	1 year	1 year	--	3 years	Limited, case, connec-tors, 3 yrs. electr.	1-3 years
Accessories	--	Input car, truck power cable; carry bag; ext. battery charger	Input car, truck power cable; carry bag; ext. battery charger	Input car, truck power cable; carry bag; ext. battery charger	--	Numerous	Numerous	GPS, CDPD/N/A/N/A

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MANUFACTURER→	*Kontron*	*LXE*	*LXE*	*LXE*	*Melard Technologies*	*Mobile Knowledge*	*Motorola*	*Motorola*
PRODUCT→	ReVolution	VX4	MX3-CE	VX1	Sidearm	Series 6000	Mobile Laptop ML 800	Mobile Workstation MW 800
↓SPECS								
Dimensions (WxDxH)	11.6 x 10 x 1.75 in.	9 x 12 x 3.9 in.	8 x 6 x 1.35 in.	9 x 12 x 3.25 in.	1.5 x 7.25 x 8.66 in.	8.25 x 5.5 x 2.13 in.	10.8 x 9.4 x 1.7 in.	CPU: 2.7 x 7 x 8.5 in. dis.: 12.1 x 12 x 2 in. key.: 2 x 12 x 8 in.
System weight	8 lbs.	7.8 lbs.	1.9 lbs.	5 lbs.	2.4 lbs.	2.2 lbs.	5.5 lbs.	CPU: 5.5 lbs.; dis.: 4 lbs.; key.: 3 lbs.
Physical description	Laptop to tablet PC	Rugged, veh. mount, wireless	Half VGA horiz., rugged, handheld,	Half VGA horiz. rugged Combo high impact	Rugged handheld PC	Proc. power, =10	Ruggedized mobile notebook computer	Rugged fixed mobile data workstation
Construction materials	Magnesium	Black polycarbonate/ polyester blend, plastic	--	Black polycarbonate/ polyester blend plastic	PC/ABS blend housing	RF-shielded cycoloy C1110HF	Magnesium	Cast aluminum polycarbonate/ABS
Meets which military specs?	Mil-Std-810F	Mil-Std-810F, Annex C, Figure 514.5C-3.	Mil-Std-810F, Annex C, Figure 514.5C-3.	Mil-Std-810F, Annex C, Figure 514.5C-3.	Mil-Std-810E	N/A	Mil-Std-810E	Mil-Std-810E
Vibration specs	Mil-Std-810F	Mil-Std-810F, Annex C	Mil-Std-810F, Annex C	Mil-Std-810F, Annex C	Mil-Std-810E	Untested	IEC 68-2-6/ Mil-Std-810E, method 514.4	IEC 68-2-6/Mil-Std-810E, method 514.4
Processor	P III	Intel Pentium MMX	Intel SA-1110	Intel 486 SX ULP	StrongARM	StrongARM SA-1110	PIII	PIV
Processor speed	1.06 to 1.2 GHz	206 MHz - 400MHz	206 MHz	--	206 MHz	206 MHz	700 MHz	1.7 GHz
Laptop	Yes	No	Yes	No	No	No	Yes	No
Stationary in-vehicle	Yes with mount	Yes	Mounted or carried	Yes	No	Yes	When docked	Yes
Stationary	Yes with mount	Yes	Can be mounted	Yes	No	Yes	No	Yes
Handheld	No - Tablet	No	Yes	No	Yes	No	No	No
Mountable	Yes	Yes	Can be mounted	Yes	Yes	Yes	Yes with hot-dock	Yes
Tablet	Yes	No	Yes	No	No	Yes	No	No
Display	SVGA transfl. XGA trans.	TFT display	640x240 VGA LCD	Electro luminescent	VGA	5.7 in. Sharp	XGA	XGA
Std. display size	12.1	10.4 in.	--	--	6.5 in.	4.87 x 3.7 in.	10.4 in.	12.1 in
Opt. display size	N/A	--	5.92 in.	--	N/A	N/A	10.4 in.	12.1 in.
Display backlit	Yes	--	Yes	--	Yes	Yes	Yes	Yes, 1200 NIT
Sunlight-visible displays	Yes, opt. SVGA transfl.	Yes	Yes	Yes	Yes	Yes	Yes; transflective	Yes
Operating system	Win. 98, 2000, ME, XP, Linux	Windows 98, 2000	Yes Windows CE 3.0	ROM-DOS 6.22	Windows CE 3.0	Multiple offered	Win. 2000/XP Home or Pro	Win. 2000/XP Pro
Message memory available(std./max.)	128MB up to 640MB	64 MB SDRAM with 128 MB opt.	32 MB SDRAM 16 MB Flash	4 MB RAM 8 MB Flash	64 MB std. 96 MB max.	--	128 MB std. 256 MB max	256 MB DDR RAM std. 512 MB DDR RAM max
Floppy drive description	Yes	--	--	--	No	No	Yes, external USB	Yes, external USB
Floppy/CD-ROM combo	DVD Standard, CD and DVD/CDRW opt.	--	--	--	No	No	Yes, external drive	Yes, external drive
Ports:								
Serial	1 system, 2 with dock	2 RS 232 (DA9)	--	2 RS-232 (DA9)	Yes	Yes	2	1 external, 2 internal
PS/2	Yes	--	--	Yes	No	No	1 + keyboard/mouse	--
Parallel	Yes, with dock	--	--	--	No	No	--	--
USB	2 V. 2.0	--	--	Yes	Yes	Yes	1	2
Fire wire	Future	--	--	--	No	No	No	Yes
Keyboard:								
Detached or integrated	Integrated	Detached	Integrated	Integrated or detached	Integrated	Integrated	Integrated	Backlit detached
Size	Full 85 keys	QWERTY	QWERTY	QWERTY and ABCD	QWERTY 75 keys	Touch screen	Std. QWERTY	Std. QWERTY
Water-resistant	NEMA 3	IP66	IP66	IP66	Yes	No	Yes	Yes
# of user-programmable keys	Software dependent	--	--	--	10	N/A	--	8
Operating current	Less than 2 A	--	--	--	2.0 A on duty cycle	500 mA	--	N/A
Operating temperature	-15° to 60° C	-4° to +122 °F	-4° to +122 °F	-4° to +122 °F	-20° to +60° C	-10° to +65° C	-20° C to 45° C	-20° to + 55° C
Power supply	Yes, battery,12 V vehicle	10–60 V internal	Battery	10–80 VDC internal	Battery	Vehicle	Yes	13.8 V vehicle battery
Battery type	Li-ion	--	Li-ion	--	Li-ion	N/A	Li-ion	N/A
Battery life	3.5 hours per battery,	--	8+ hours	--	8-10 hours	N/A	5400 mAH	N/A
Standard modem type	Yes, 56K	--	--	--	Yes, 56K .V. 92	No	Yes, 56 kbps	Yes, 56 kbps
Communication capabilities	No GPS 802.11b wireless LAN Bluetooth	--	--	--	56k CDPD Cingular, Motient, WLAN	Depends on external modem selected	Yes internal 56 kbps; CDPD/LAN/GPS/GPRS /IDEN	Private DataTac,CDPD, GPRS,
Incoming message indicator	Future	--	--	--	Yes	Yes	No	Yes
Forms creation capability	Software dependent	--	--	--	Via software	Yes	Yes	Yes
Peripheral interfaces	RS232, USB 2.0	--	--	--	Serial port, USB host port	Smartmeter, Magswipe	USB/serial/PCMCIA	USB/key/fire/PCMCIA
Soft keys	Software dependent	--	--	--	Yes	N/A	F1-F12	8 programmable
Rugged data input devices	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
If yes, type?	Mouse pad, touch screen	--	--	--	Laser scanner		USB keyboard/mouse	USB keyboard/mouse
Voice group dispatch	--	--	--	--	N/A	No	No	No
Network options	Yes, LAN, 802.11b	--	--	--	CDPD, Cingular, Motient	--	Yes, Ethernet 10/100	Built-in Ethernet 10/100
Field programmable	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other field service capabilities	Removable HDD, PCMCIA	--	--	--	Flash storage	On-board diagnostics	--	Hard drive swap, four screws on the bottom
Over-the-air security/ network encryption	--	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supports what GPS	--	--	--	--	Garmin	Mob. Knowl. 12-chan.	PCMCIA, external	Trimble Lassen SKII
Water resistant/waterproof	Yes, NEMA 3	Yes	Yes	Yes	Yes	No	IP52	Yes
Mounting options	In vehicle with docking station opt.	Multiple options avail.	Veh. mount options avail.	Multiple opt. avail.	Veh. docking station	Dash/floor w/harness	Hot-docking cap., ped. mount, console mount	Hot-docking cap., ped. mount; console mount
List software bundles avail.	--	--	--	--	--	N/A	None	None
Is a software developers' kit available?	N/A	--	--	--	Yes	Yes	None	Yes
Applications markets	Public safety, criminal investigation, utilities	Whse., dist., mfg., maint.	Whse., dist., mfg., maint.	Whse., dist., mfg., maint.	Field service, telecom, cable	Taxi, limousine	PMDC; AirMobile; text messenger	PMDC; AirMobile; text messenger
Warranty	1-3 years	--	--	--	1 year std.	1 year	3 years	1-3 years
Accessories	I/O stick, additional batteries, softcase	--	--	--	Laser scanner, docking station, carry case, printer, Garmin GPS	--	Docking station, ext. battery charger, car adapter, battery pack	2ndary display, 2ndary keyboard, mounts, radio interface kits

MANUFACTURER→	*Motorola*	*Northrop Grumman*	*Northrop Grumman*	*Palomar*	*Panasonic*	*Panasonic*	*Panasonic*	*Symbol Technologies*
PRODUCT→	**Portable Tablet PT 800**	**MobileVu**	**Handheld PDT 8100**	**Trooper**	**Toughbook CF-28**	**Toughbook CF-34**	**Toughbook CF-48**	**PDT 81XX**
↓SPECS								
Dimensions (WxDxH)	11.6 x 9.3 x 1.7 in.	Sys.: 10.6 x 11 x 5.9 in. dis.: 11.4 x 2.3 x 9 in.	8.4 x 3.7 x 1.8 in.	Dis.: 12 x 9.5 x 2.5 in. Sys.: 11 x 6 x 10 in.	11.8 x 9.5 x 2.3 in.	9 x 7.4 x 1.7 in.	12.1 x 10.2 x 1.8 in.	3.7 x 1.8 x 8.4 in.
System weight	5 lbs.	Sys.: 17 lbs; dis.: 6.2 lbs.	14.5 oz.	Sys.: 13 lbs; dis.: 5.8 lbs.	9 lbs.	3.8 lbs.	7.48 lbs	14.5 oz.
Physical description	Ruggedized tablet computer	Fixed-mount comp. w/trunk mount	Handheld rugged computer	Rugged modular mobile data system	Full mag. alloy case	Full mag. alloy case	Magnesium alloy case	---
Construction materials	Magnesium	Sys.: 16-gauge steel Dis.: Aluminum	High impact plastic	Rugged aluminum with texture poly. paint	Magnesium alloy	Magnesium alloy	Magnesium alloy	---
Meets which military specs?	Mil-Std-810E	Mil-Std-801C	IP54 standards	Mil-Std-810E	Mil-Std-810F	Mil-Std-810F	--	---
Vibration specs	IEC 68-2-6/ Mil-Std-810E, method 514.4	3.0 G rms, 5-1000 Hz	N/A	Mil-Std-810-E	--	--	--	---
Processor	PIII	PIII 600/850 MHz	Intel StrongARM	PIII/Celeron	Mobile Intel PIII	Mobile Intel PIII	Mobile Intel PIII	Intel SA1110
Processor speed	700 MHz	566 MHz	206 MHz	700 MHz/566 MHz	800 MHz w/speed step	700 MHz	1.13 GHz or 1 GHz	206 MHz
Laptop	No	No	No	No	Yes	Yes	Yes	No
Stationary in-vehicle	When docked	Yes	No	Yes	No	No	No	Yes (with veh. cradle)
Stationary	No	Mobile in veh.	No	Yes	No	No	No	No
Handheld	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Mountable	Yes, with hot-dock	Yes	Yes	Yes	Yes	Yes	No	Yes
Tablet	Yes	No	No	No	No	No	No	No
Display	XGA	SVGA/VGA	VGA	SVGA	XGA touch screen	SVGA touch screen	XGA	VGA
Std. display size	10.4 in.	12.1 in. diag.	320 x 240 portrait	12.1 in.	13.3 in.	8.4 in.	14.1 in	VGA
Opt. display size	10.4 in.	10.4 in. diag.	N/A	N/A	12.1 in.	--	--	320 x 240
Display backlit	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Sunlight-visible displays	Yes, transflective	Yes	Yes, w/touch panel	Yes	Yes	Yes	No	Yes
Operating system	Win. 2000/XP Pro	Win. 98/2000	MS Pocket PC	Win. 98, NT 4.0, 2000	Win. NT/2000	Win.98/NT/2000	Win. 98 SE	Pocket PC 2002
Message memory available(std./max.)	128 MB std. 256 MB max	64 MB std., 256 MB max	64 MB RAM, 32 MB ROM	128 MB PC100 RAM std. 512 MB PC100 RAM	256 SDRAM std. exp. to 512 MB	256 MB SDRAM	256 MB SDRAM exposure to 512 MB	64 MB RAM/32 MB ROM
Floppy drive description	Yes, external USB	3.5 in. std.	No	Yes, internal	Yes	No	Yes	No
Floppy/CD-ROM combo	Yes, external drive	Yes	No	External opt. available	Yes	No	Yes	No
Ports:								
Serial	1	6	IrDA 1.1; RS-232	5	Yes	Yes	Yes	Yes
PS/2	--	1	--	1	Yes	--	Yes	No
Parallel	--	1	--	1	Yes	--	Yes	No
USB	1	2	--	2	Yes	Yes	2	No
Fire wire	No	Opt. exp. avail.	--	--	No	--	--	No
Keyboard:								
Detached or integrated	Backlit detached	Detachable	Detachable	Det. rugged backlite	Integrated	Integrated	Integrated	Integrated
Size	Std. QWERTY	97 keys	28 key numeric	86 Key	87 key w/ded. Win. key	87 key w/ded. Win. key	87 key w/ded. Win. key	28-, 37-, or 47-key
Water-resistant	Yes	Yes, NEMA 4	IP54	Yes	Yes	Yes	No	Yes
# of user-programmable keys	F1-F3	8	N/A	12 func., 1 emerg. key	--	--	--	---
Operating current	3.16A AC	6 A	Internal recharg.	3-7 A opt.dep.	--	--	--	3.7 V
Operating temperature	-20° to +45° C	5° to +55° C	Mono.: -20° to +50° C	-20° to 65° C proc. dep.	--	--	--	-20° to 50° C
Power supply	Primary internal, 2ndary hot swap	Vehicle	Battery	Vehicle	Battery	Battery	Battery	Battery
Battery type	Li-ion int.1800 mAH	N/A	1550 mAh Li-ion	N/A	Li-ion	Li-ion	Li-ion	Li-ion 1550 mAh
Battery life	140 min.	7 hours nom.	Varies, 8 hours nom.	N/A	4 hours	4 hours	4 hours	8 hours
Standard modem type	Yes, 56 Kbps	Yes, opt. PCMCIA, RS/232 or PCI	Yes, opt. snap-on landline modem	N/A	Yes, 56K	Yes, 56K	Yes, 56K	Yes (snap-on) 33.3 kbps
Communication capabilities	Yes, 56 Kbps,CDPD/LAN/GPS	Opt. PCI 56K modem, PCMCIA or CDPD	Int. CDPD modem, 802.11b wireless LAN	56K modem, CDPD, radio modems, GPS	56K modem, CDPD, LAN, GPS, 802.11b	56K, CDPD, LAN, 802.11b	56K	Batch/ WLAN/ CDPD, GSM, GPRS/ Snap-on modem/ IrDA
Incoming message indicator	No	Yes, w/appl. software	Software independent	Software dependent	--	--	--	No
Forms creation capability	Yes	Yes	Yes	Software dependent	--	--	--	---
Peripheral interfaces	Fire., USB, PCMCIA, serial	Opt. USB powered	Docking cradles	232 ser., PS/2, parallel, USB	--	--	--	RS232, IrDA
Soft keys	F1-F3	Yes, opt.	No	--				
Rugged data input devices	--	Yes	Yes	Yes	--	--	--	---
If yes, type?	--	Magnetic stripe, barcode, fingerprint reader	Mag. stripe reader, 1D, 2D barcode reader	Keyboard, mag strip reader, point. dev.	--	--	--	---
Voice group dispatch	No	N/A	N/A	N/A	--	--	--	No
Network options	--	User trans. RF LAN	CDPD, GPRS	10/100 Ethernet LAN	--	--	--	802.11b, CDPD, GPRS
Field programmable	Yes	Yes, w/SW	Yes	Yes	--	--	--	Yes
Other field service capabilities	--	Unattended video mon.	-- Inventory, jail appl.	--	--	--	--	---
Over-the-air security/ network encryption	Yes	Yes	Yes on wireless LAN	Software dependent	--	--	--	Yes
Supports what GPS	Trimble Lassen SKII	Trimble, Garmin, WAAS	Opt. Linxpoint, GPS	All major brands	--	--	--	Third-party module
Water resistant/waterproof	IP52	Yes, NEMA 4	Yes	--	Yes	Yes	No	Yes
Mounting options	Hot-docking cap., ped. mount; cons. mount	Fixed and movable	Multiple cradle opt.	Multiple solutions available	--	--	--	Vehicle cradle
List software bundles avail.	No	GPS Mapping, RF LAN/modem roaming	Barcode, magnetic strip reader	--	Dual-load MS NT/2000,diagnostics	Preloaded MS 98, setup, diagnostics	Setup diagnostics, online ref. mount	---
Is a software developers' kit available?	No	No	Available from MS	--	Yes	Yes	Yes	Yes
Applications markets	PMDC; AirMobile; text messenger	Public safety, utility, transportation	Public safety, incl. jails, inv. mgmt.	--	Telco, utilities, field service	Law enf., gov., telco, utilities	Field service, govt., healthcare	Field service, trans., logistics, route acct.,
Warranty	3 years	1 yr. std., opt. 4 yrs.	1 year	1 year mfg., opt. 2, 3 yrs.	3 years p&l	3 years p&l	3 years p&l	1 year
Accessories	Docking station, back-lit wireless, keybd., port replicator	Multiple monitors, displays, keyboards	Portable printers	CD-ROM, CDPD modem, wireless LAN, mag. stripe reader, printer, video capture	CD-ROM, DVD-ROM, Combo drive, tele-phone line tester	Vehicle mount	Memory cards	Int. laser scanner, magnetic stripe reader, autocharge, printers, 4-slot Ethernet cradle

MDCs/RUGGEDIZED LAPTOPS

MANUFACTURER→	Symbol Technologies	Symbol Technologies	Walkabout	Wescor	Wescor	Xplore Technologies	Xplore Technologies	Xplore Technologies
PRODUCT→	PPT 28XX	PDT 75XX	Hammerhead 3	RDT800	Rx600	GeneSys Maximus	GeneSys II	Ramline PIII510
↓SPECS								
Dimensions (WxDxH)	3.6 x 1 x 7 in.	3.5 x 2.2 x 8.4 in.	11.25 x 1.5 x 8 in.	10.45 x 12.2 x 1.6 in.	9.125 x 5 x 1.25 in.	12 x 9 x 1.5 in.	12 x 9 x 1.5 in.	13.4 x 9.7 x 3.7 in.
System weight	10.3 oz.	1 lb. 3 oz.	4.6 lbs.w/battery	3 lbs. 7 oz.	1 lb. 7 oz.	6 lbs.	6 lbs.	7 lbs.
Physical description	---	--	Rugged tablet PC w/alum. housing	Rugged, erg. case, fixed and cradle mount	Rugged, erg. case, fixed and cradle mount	Powerful, rugged, mobile pen system	Powerful, rugged, mobile pen system	Powerful, rugged, mobile pen system
Construction materials	---	--	70-75 T6 aircraft-grade alum.	Polycarbonate blend	Polycarbonate Blend	Magnesium alloy	Magnesium alloy	Aluminum mag. alloy
Meets which military specs?	---	--	--	Mil-Std-810E	Mil-Std-810E	Mil-Std-810F	Mil-Std-810F	Mil-Std-810E
Vibration specs	---	--	17 Grms	Mil-Std-810E	Mil-Std-810E	Mil-Std-810F	Mil-Std-810F	IEC68-2-13/Mil-Std-810E
Processor Processor speed	Intel SA1110 206 MHz	Elan 486 66 MHz	PIII 400 MHz	186 Class 28 MHz	186 Class 28 MHz	Intel PIII 500-700 MHz	Intel PIII 500-700 MHz	Intel PIII 500 MHz
Laptop	No	No	No	Yes	No	No	No	No
Stationary in-vehicle	Yes (with veh. cradle)	Yes (with veh. cradle)	No	Yes	Yes	No	No	Yes
Stationary	No	No	No	Yes	Yes	No	No	No
Handheld	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mountable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tablet	No	No	Yes	No	Yes	Yes	Yes	Yes
Display	VGA	CGA	SVGA	VGA	VGA	SVGA	SVGA	SVGA
Std. display size	VGA	1/8 CGA	10.4 in.	5.75 in.	5.75 in.	12.1 in	10.4 in.	10.4 in.
Opt. display size	320 x 240	240 x 160	--	--	--	Same	Same	Same
Display backlit	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Sunlight-visible displays	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Operating system	Pocket PC 2002	WinCE V.3.0/DOS V.6.22	Win. 98/2000/XP	DOS 6.22	DOS 6.22	Windows98/2000/XP	Windows98/2000/XP	Windows 98/2000
Message memory available(std./max.)	64MB RAM/32MB ROM	4 to 16 MB RAM/ 4 to 16 MB Flash	128 MB std., 256 MB opt.	2 MG std, 4.8 MG opt.	2 MG std., 4.8 MG opt.	128, 256, or 512 MB	128, 256, or 512MB	128 or 256 MB
Floppy drive description	No	No	USB	No	No	External	External	External
Floppy/CD-ROM combo	No	No	Yes	No	No	No	No	No
Ports:								
Serial	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PS/2	No	No	No	Opt.	Opt.	Yes	Yes	Yes
Parallel	No	No	Yes	No	No	Yes	Yes	Yes
USB	No	No	Yes	No	No	Yes	Yes	Yes
Fire wire	No	No	PCMCIA	No	No	No	No	No
Keyboard:								
Detached or integrated	Snap-on	Integrated	Detached or on-screen	Integrated	Pop-up on screen	Detached rug. keyboard	Detached rug. keyboard	Detached rug. keyboard
Size	35 QWERTY keypad	49-, 36-, 25-key	Standard	78 key	Standard PS/2	88	88	88
Water-resistant	Yes	Yes	Yes	Yes, Mil.-Std.-810E	Yes Mil.-Std.-810E	Yes	Yes	Yes
# of user-programmable keys	---	---	--	5	5	1	1	5
Operating current	3.7V	7.2 V	1 A	20mA standby, 200 mA	20mA standby 190mA	3 A	3 A	2 A
Operating temperature	-20° to 50° C	-25 °to 50° C	0° to 55° C	-20° to +70°C	-20° to +70° C	-25° to +60° C	-25° to +60° C	-5° to +50° C
Power supply	Battery	Battery	Battery, vehicle, desk	Vehicle	Vehicle	Smart battery	Smart battery	Smart battery
Battery type	Li-ion 1550 mAh	Li-ion 1400 mAh	Li-ion, 2100 mAh	--	--	Li-ion	Li-ion	Li-ion Dr202S
Battery life	8 hrs.	8 hrs.	--	--	--	6 hours	4 hours	4 hous
Standard modem type	Yes (snap-on) 33.3 kbps	No	No	--	--	No	No	No
Communication capabilities	Batch/WLAN/CDPD, GPRS/Snap-on modem/ IrDA	Batch/WLAN/Data Tac/ IrDA	PCMCIA, GPS, GSM internal opt.	GPS, AMPS, GSM, J1708 vehicle buss, digital I/O for control	GPS, AMPS, GSM, J1708 vehicle buss, High power digital I/O	56K modem, CDPD, LAN, GPS	56K modem, CDPD, LAN, GPS	56K modem, CDPD, LAN, GPS
Incoming message indicator	No	No	No	Yes	Yes	No	No	No
Forms creation capability	---	---	--	Application driven	Application driven	No	No	No
Peripheral interfaces	RS232, IrDA	RS232, IrDA	Docking	RS232,PS/2, digital I/O	RS232,PS/2, digital I/O	Serial, parallel, USB	Serial, parallel, USB	Serial, parallel, USB
Soft keys	---	No	No	Yes	Yes	--	--	--
Rugged data input devices	---	---	Yes	Yes	Yes	Yes	Yes	Yes
If yes, type?			Pen, touch	Opt. barcode input	Opt. barcode input	Pen, touch	Pen, touch	Pen, touch
Voice group dispatch	No	No	No	No	No	Yes	Yes	Yes
Network options	802.11b, CDPD, GPRS	802.11b, Data Tac	PCMCIA	Cellular – AMPS, GSM	Cellular – AMPS, GSM	--	--	--
Field programmable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other field service capabilities	---	---	Hard drive change	--	--	--	--	User acces. PC slots
Over-the-air security/ network encryption	Yes	Yes	No	Application driven	Application driven	No	No	No
Supports what GPS	Third party module	No	Garmin, Astech	8 & 12 channel	8 & 12 channel	Yes	Yes	Yes
Water resistant/waterproof	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Mounting options	Vehicle cradle	Vehicle cradle Win CE v. 3.0/DOS v. 6.22	Vehicle, wall, desk	Fixed mount & snap-in cradle	Fixed mount & snap-in cradle	GeneSys Quick Release Plus	GeneSys Quick Release Plus	Desk mount, forklift, mobile cart
List software bundles avail.	---	--	--	--	--	N/A	N/A	N/A
Is a software developers' kit available?	Yes	Yes	Yes	Yes	Yes	No	No	No
Applications markets	Field service, sales force auto., trans.	Field service, trans., logistics, route acct.	Utilities, public safety, trans., GIS, constr.	Mobile messaging & communication	Mobile messaging & communication	Law enf., EMS, fire safety, utility	Law enf., utility, warehousing, public safety	Warehousing, distribution, trans.
Warranty	1 year	1 year	1 yr. comprehensive	1 year + serv. contracts	1 year + serv. contracts	3 years std.	3 years std.	1 year std., 3 yr. opt.
Accessories	4-slot serial, Ethernet cradle, single slot serial cradle, veh. charging cradle	1-, 4-slot serial cradles, vehicle cradle, holsters	Docking systems, padded case, hard drive, LCD display	--	--	USB floppy drive, USB CD-ROM, rugged keyboards, disk on key, USB Ethernet adap.	USB floppy drive, USB CD-ROM, rugged keyboards, disk on key, USB Ethernet adap.	USB floppy drive, USB CD-ROM, rugged keyboards, disk on key, USB Ethernet adap.

NEW PRODUCTS

Tone Remote Controller

IDA Corp., a Fargo, N.D.-based designer and manufacturer of conventional and trunking equipment for the LMR market, announced the Model 24-30 tone remote controller. The newest addition to its family

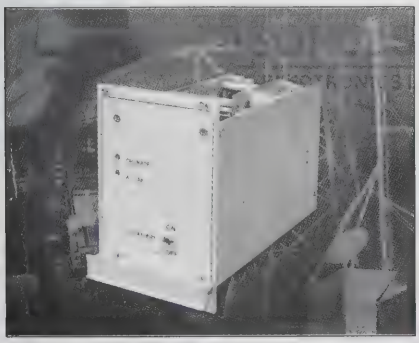
of remotes and panels, IDA's Model 24-30 is available for either 110- or 12-volt operation and features 2/4 wire operation, full duplex, up to four channels, a handset or desk microphone, intercom and mute, and optional wall mount. ***Circle #154***

5.8 GHz Fixed Wireless

Calgary, Canada-based **Wi-LAN** launched a new line of 5.8 GHz fixed wireless access products. AWE 120-58 Ultima3 products can be used for broadband access applications alone or in combination with wired alternatives. The rugged, weatherproof, single-unit design features improved scalability, multilayered security, dynamic power control, and tiered service management. Coverage cells can be added and expanded quickly and cost-effectively. The current hardware is capable of supporting several generations of system software enhancements. ***Circle #155***

UPS Plug-In Module

Absopulse Electronics released the REW60-24, a 24-volt DC single output compact uninterruptible power supply



(UPS) plug-in module with an AC input range of 95-volt to 264-volt AC. In the event of an AC power failure, the battery powers the load via an electronic regulator, which typically provides a 4-amp current limit on the 60-watt output at full load. The UPS is suitable for applications requiring very low output noise. It also serves as a power conditioner, blocking surges, spikes, and transients while maintaining stable voltage. ***Circle #156***

Switching Power Supply

Dataradio introduced the SPS 2412/75 switching power supply accessory for Dataradio products requiring 24-volt automation and control systems. The SPS 2412/75 is available in two models that provide filtering for DC and external I/O to protect units against power surges and fluctuations. The SPS 2412/75 is compatible with Dataradio's wireless modems including the Integra H, Inte-

CIRCLE #94

NEW PRODUCTS

gra-TR, and T-96SR, as well as the company's DL-3400 series and RNet JSLMs. *Circle #157*

VHF/UHF LTR Mobile Radios

Vertex Standard unveiled the VX-2500 mobile series for logic trunked radio (LTR) and conventional mode communications. The mobile features a rugged design and meets Mil Std 810 C/D/E standards for low pressure, shock, vibration, temperature, solar radiation, humidity, rain, dust, and salt fog. The series also offers 25-watt RF power output, 250-channel (conventional) and 640-channel (trunking) capabilities, versatile scanning, alphanumeric display, programmable alert tones, and a front-mounted speaker. For narrowband applications, the audio companding system provides clear transmissions with significantly reduced background noise. *Circle #158*

Wireless LAN Coverage Extension

Kaval Wireless Technologies introduced DataWave to its current line of in-building wireless coverage products. The product is a transparent wired network system that integrates over-the-air data transceivers and wireless LAN client cards to enable end users to wirelessly access a local server. DataWave is designed to extend high-speed wireless LAN coverage for enterprise business users and public facilities such as airports, health care centers, conference and hospitality centers, shopping malls, and campus environments. *Circle #159*

Mobile Radios

ICOM America announced the new IC-F520 VHF and IC-F620 UHF series mobiles, designed and built for land mobile professional use. Both models feature 256 memory channels and 10-character alphanumeric "tagging" for easy channel identification. The large backlit liquid crystal display (LCD) allows for easy viewing night or day. The radios also feature a reversible chassis to accommodate top-firing or bottom-firing speaker

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CIRCLE #96

NEW PRODUCTS

applications in varied mobile environments. Up to nine programmable buttons are available for frequently used functions including scan, priority, trunking group switch, emergency ID and repeat, and other functions. ***Circle #160***

IP Mobility Solution

Freemont, Calif.-based **Green Packet** announced the availability of SON-access, an IP mobility solution that enables users to roam seamlessly between hybrid wireless networks and hot spots while maintaining uninterrupted access to corporate networks and data. SONaccess consists of a set of carrier-grade IP routers and client software for wireless devices such as laptops, PDAs, and smart phones. The solution integrates existing wireless LAN and cellular network infrastructure into a simple, seamless solution that optimizes mobile connectivity and performance. ***Circle #161***

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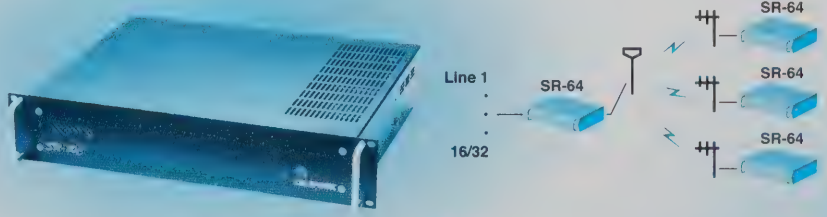

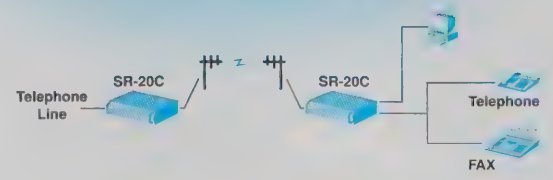

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CIRCLE #97

WLAN Measurement Device

Berkeley Varitronics Systems' new Yellowjacket WLAN measurement device is a 802.11b modular analysis system that combines the interface of Compaq's

iPAQ and Berkeley's precision receiver hardware and software. Designed specifically for sweeping, analyzing, and optimizing 2.4 GHz WLANs, Yellowjacket enables a user to survey any access point on any direct sequence spread spectrum (DSSS) channel. The device provides measurements such as multipath, wired equivalent privacy (WEP), and received signal strength indicator (RSSI). Data can be captured and played back on the device's color touchscreen or on any PC. ***Circle #162***

Voice-Enabled BlackBerry Service

Bellevue, Wash.-based **VoiceStream Wireless** announced it is now offering service on the voice-enabled Research In Motion BlackBerry 5810 wireless handheld e-mail solution that includes an integrated wireless PC data card modem. The service, which runs on

VoiceStream's iStream high-speed GSM/general packet radio service (GPRS) wireless data network, is available in more than 6,500 North American cities. At

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NEW PRODUCTS

speeds of about 40 kbps, BlackBerry users can quickly and securely send and receive e-mail and text messages, access the Internet, and receive custom news and information alerts. ***Circle #163***

Ground Rod Driver

Lightning protection and grounding equipment maker **Harger Lightning & Grounding** introduced its new ground rod driver, which provides a safe and simple way to install ground rods. The product allows users to drive a ground rod to ground level without using a stepladder or sledgehammer. The driver includes soft,

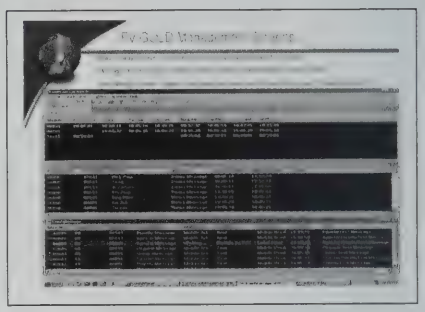
rubber grips, an insert for driving rods to ground level, and a retaining strap to hold the insert in place during storage. It can be used on all types of ground rods including copper-clad, galvanized, and stainless steel. ***Circle #164***

CTIA Certification Program

The Cellular Telecommunications & Internet Association (CTIA) introduced a new certification program aimed at helping speed time to market for new wireless products. Seven laboratories based throughout the United States and Europe will test wireless products for the program, providing the wireless industry with an independent and centralized product evaluation service. Products passing CTIA's analysis are granted the right to display a certification seal. ***Circle #165***

GPS-Based Automatic Status Reporting

WirelessDataSolutions/DINET, a wireless fleet tracking systems provider, announced its new FleetVantage GOLD product that uses GPS wireless technology for automatic status reporting. FleetVantage's color-coded vehicle icons, which depict actual truck status, allow users to easily identify the status and real-time location of their vehicles. Other features



include the capability to store more than 100 locations in each mobile data terminal (MDT); real-time status reporting with time-stamped tracking; and the capability to reroute drivers by sending new address locations with GPS coordinates to the driver, which also automatically alerts dispatch when the vehicle arrives. ***Circle #166***

Fleet Management Services

Discrete Wireless introduced new user-defined fleet reporting, sensor capabilities, and improved mapping tools for service industry dispatchers. Discrete's system offers upgraded tracking capability including

CIRCLE #98

See Us at APCO CIRCLE #99

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1. Please check the box that best describes your function.

- ❑ A. Corporate Management
- ❑ B. Operations/Administration
- ❑ C. Technical/Engineering
- ❑ D. Sales/Marketing
- ❑ Z. Others Allied to the Field—Please Specify _____

2. Check the box that best describes your organization AT YOUR LOCATION. (Check ONE box)

PUBLIC SAFETY AND GOVERNMENT
- ❑ A. Law Enforcement
- ❑ B. Fire Department
- ❑ C. Emergency Management
- ❑ D. State/Local Government
- ❑ E. Federal Government/Military

BUSINESS/INDUSTRY/TRANSPORTATION
- ❑ F. Public Utility
- ❑ G. Petroleum Industry
- ❑ H. Telecom/Cable/Broadband
- ❑ I. Transportation/Fleet Services
- ❑ J. Other Business/Industry/Field Service

NETWORK SERVICE PROVIDER
- ❑ K. Mobile Radio Operator
- ❑ L. Paging/Messaging Provider
- ❑ M. Cellular/PCS Provider
- ❑ N. Satellite and Other Networks

PROFESSIONAL SERVICE PROVIDER
- ❑ O. Engineering/Consulting Firm
- ❑ P. Wireless Application Service Provider
- ❑ Q. Associations and Other services

PRODUCT DISTRIBUTION
- ❑ R. Manufacturer of Comm. Equip.
- ❑ S. Rep. or Distributor of Comm. Equip.
- ❑ T. Mobile Comm. Dealer/Reseller
- ❑ Z. **OTHER** allied to field _____

3. Do you specity, recommend or purchase mobile communications equipment or services?
❑ A. Yes ❑ B. No

4. Approx. how many mobile voice and data units does your company use at your location?
❑ A. none ❑ B. 1-10 ❑ C. 11-25 ❑ D. 26-50
❑ E. 51-100 ❑ F. 101-500 ❑ G. 501-1000 ❑ H. over 1000

5. Is there any servicing of mobile equipment at your location? ❑ A. Yes ❑ B. No

6. This inquiry is for: ❑ A. Immediate need ❑ B. Project 6-12 months ❑ C. Project more than 1 year

Circle the numbers which correspond to the products on which you want more information.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
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267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304

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- ❑ A. Law Enforcement
- ❑ B. Fire Department
- ❑ C. Emergency Management
- ❑ D. State/Local Government
- ❑ E. Federal Government/Military

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- ❑ J. Other Business/Industry/Field Service

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- ❑ K. Mobile Radio Operator
- ❑ L. Paging/Messaging Provider
- ❑ M. Cellular/PCS Provider
- ❑ N. Satellite and Other Networks

PROFESSIONAL SERVICE PROVIDER
- ❑ O. Engineering/Consulting Firm
- ❑ P. Wireless Application Service Provider
- ❑ Q. Associations and Other services

PRODUCT DISTRIBUTION
- ❑ R. Manufacturer of Comm. Equipment
- ❑ S. Rep. or Distributors of Comm. Equipment
- ❑ T. Mobile Communications Dealer/Reseller
- ❑ Z. **OTHER** allied to field _____

4. Do you specity, recommend or purchase mobile communications equipment or services?
❑ A. Yes ❑ B. No

5. Approx. how many mobile voice and data units does your company use at your location?
❑ A. none ❑ B. 1-10 ❑ C. 11-25 ❑ D. 26-50
❑ E. 51-100 ❑ F. 101-500 ❑ G. 501-1000 ❑ H. over 1000

6. Is there any servicing of mobile equipment at your location? ❑ A. Yes ❑ B. No

7. What wireless technologies does your organization plan to use/buy over the next 2 years? (check all that apply)

- ❑ A. Conventional Two-Way
- ❑ B. Trunking
- ❑ C. Cellular/Personal Communications
- ❑ D. Tone Signaling (ANI, Encryption, etc.)
- ❑ E. Interconnect
- ❑ F. Paging/Messaging
- ❑ G. Mobile Data
- ❑ H. SCADA/Telemetry
- ❑ I. Location Technologies
- ❑ J. Microwave Radio
- ❑ K. Satellite
- ❑ L. CAD
- ❑ Z. other _____

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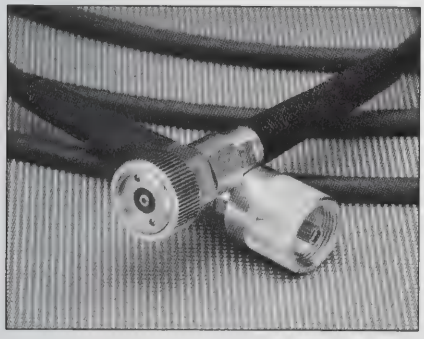
an enhanced dispatch console software module using Microsoft's MapPoint 2002 software. The new sensor services enable it to monitor door opening and closing, idle time, and refrigeration. ***Circle #167***

High-Speed Wireless Networking

U.S. Robotics, a provider of Internet access and connectivity products, announced its complete line of 22 Mbps wireless access networking products, which offer backward compatibility with 802.11b products. The suite is designed for quick and easy installation and allows users to securely share Internet access, files, and printers. The products, which are based on Texas Instruments' ACX100 802.11 technology, are capable of networking multiple PCs and include a bridging function to support building-to-building roaming and networking. ***Circle #168***

Coaxial Test Cables

Times Microwave Systems announced the availability of its PhaseTrack 230R 50-ohm thermally stable coaxial test cables. The new cables employ a dielectric material, TF-4, which exhibits low phase change, allowing for the retention of test equipment calibration within a changing temperature environment. In addition, the front-end connectors are removable and can be interchanged with a variety of different connector types



including SMA, TNC, N, 7 mm, and 3.5 mm. PhaseTrack 230R cables are ruggedized for use in a wide variety of applications. ***Circle #169***

Plug-In Encyrption

Midian now offers plug-in encryption for Motorola's entry-level radios including the CT-250/450, PRO-3150, and P040/P080. The MOT-TVS-2-PRO-EL is a high-level rolling code scrambler and the MOT-VPU-15-PRO-EL is a voice inversion scrambler. Midian's TVS scramblers use a frequency-hopping type of rolling code instead of frequency sweeping for higher security. The VPU-15 series can automatically detect scramble/clear conversation when used with other VPU-15 scramblers. Both scramblers utilize Midian's Kryptic signaling format for features such as deadbeat disable, selective calling, ANI, and over-the-air reprogramming when used with the CAD-300. ***Circle #170***

Battery Adapters

A manufacturer of battery chargers, analyzers, conditioners, and testers for the LMR and cellular markets, **iTECH** released its new Yaesu battery adapters

for the iQ^{five}, iQ^{ten}, and iQpac battery analyzer/conditioner products. The adapters are compatible with the new Li-ion Yaesu Vertex VX-800 and VX-900 portable radios. ***Circle #171***

Equipment Leasing Program

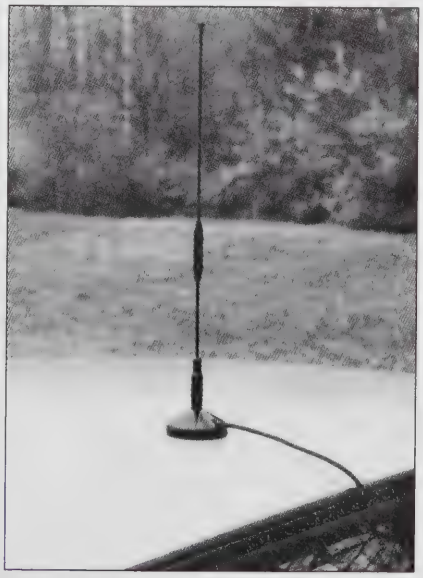
Microwave Data Systems (MDS), a provider of wireless networking solutions with applications in the SCADA/telemetry, telecommunications, and online transactional markets, introduced an equipment leasing program to provide customers with cost-effective alternatives for their networking needs. By leasing equipment from MDS, customers receive solutions as well as budgeting advantages, potential tax benefits, credit-line preservation, and capital conservation. The program also allows future proofing of a network by ensuring customers have the most current technology. When it is time to upgrade, salvage and disposal issues are also eliminated. ***Circle #172***

Wireless Modem

Nextel Communications released a new wireless modem for laptops and new data compression technology that promises to increase the speed of wireless data by up to five times. The iM1100 wireless modem, which works through any device with a Type II PCMCIA card slot, supports direct Internet connections as well as dial-up access. The modem is priced at $350, and Nextel is offering flat-rate data service for $55 a month. ***Circle #173***

Magnetic-Mount Dual-Band Antenna

STI-CO Industries introduced a magnetic-mount dual-band antenna, the latest addition to its family of cellular mount-disguised antennas. Operating on VHF and UHF channels, STI-CO's new antenna can be moved from one vehicle to another without damage to the car or antenna, allowing a user to avoid drilling

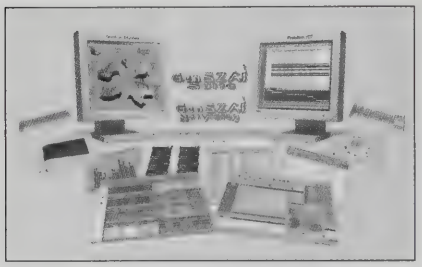


holes in the car. The VHF frequency of the MGNT-DB-VHF/UHF is 150-174 MHz and the UHF range is 405-420 MHz. The 16-inch, closed-coil antenna has a black finish and a power rating of 150 watts. ***Circle #174***

NEW PUBLIC SAFETY PRODUCTS

Public Safety Management Solutions

The Genesis Group introduced two new management solutions for the public safety industry. GenSZAI (Genesis SmartZone



Airtime Interface) works behind the scenes to capture call packets and put them into a structured query language (SQL) database, which can be used for reports, graphs, and queries. NetVista allows system managers to monitor all of the SmartZone system information such as call activity, channel activity, and traffic statistics from anywhere on a LAN. GenSZAI and NetVista work together with Microsoft Excel to provide reporting convenience. ***Circle #175***

Picture Messaging

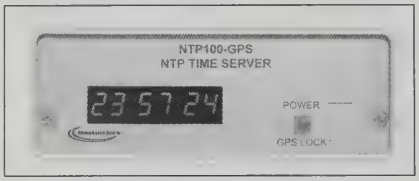
Electric Pocket released Pixer, a multimedia messaging service (MMS) application for Palm OS and Pocket PC handhelds that lets users send photos, sketches, and hand-written notes to mobile phones. Users can either import photographs into Pixer or choose from an extensive catalog of ZipNotes templates featuring business stationary and other fun graphics. Pixer is available for handhelds and other communication devices running Palm OS versions 3.5 and 4.0, including the Palm m500 series, the Handspring Treo Communicator series, and the Compaq iPAQ. ***Circle #176***

SIM Controller

M/A-COM launched its IP-capable SitePro/Site Interface Module (SIM) controller, which enables users of M/A-COM's EDACS or ProVoice critical communications systems to access a number of high-level features including enhanced security and prioritization functions. The SitePro design includes two integrated Ethernet ports, which connect to a site data hub allowing remote site programming. In an EDACS or ProVoice network, the SitePro/SIM controller interprets and directs inbound calls, processes the calls, and issues appropriate commands about how the calls are handled. The controller performs database-related functions such as dynamic regroup and unit enable/disable. ***Circle #177***

NTP Time Synchronization

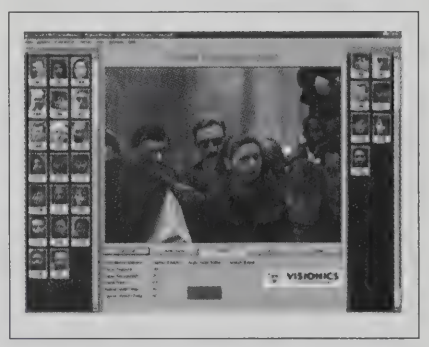
Masterclock announced a line of network time protocol (NTP)-driven clocks. A customer simply plugs the clock into an Ethernet LAN and the clock synchronizes to NTP, the standard for network time. Clocks include the rack-mounted NTD26 and the wall-mounted NTD46 and NTD86. The NTP100 comes in GPS and time code



models to set up NTP reference. The NTP100 provides Stratum 2 accuracy and uses a 12-channel Trimble receiver module. A preamplified antenna, antenna cable, and mounting kit are included. ***Circle #178***

Wireless Facial Recognition

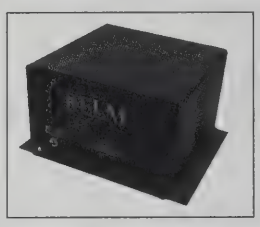
Motorola, **Visionics**, and **Wirehound** teamed up to provide real-time wireless facial recognition capabilities on mobile phones. The application, which was developed specifically for law enforcement agencies, uses Visionics' FaceIt ARGUS



as the delivery platform and Wirehound's Birddog software on the Motorola i95cl, a Java-enabled mobile phone with a colored display. The FaceIt ARGUS system automatically finds faces in a field of view and searches them against a mug shot database. Upon finding a match, the Birddog component generates a wireless alert to the phone used by mobile law enforcement officials. The phones can store multiple images. Non-matched images are automatically discarded from the system. ***Circle #179***

Mobile Extender

Relm Wireless Corp. released the RYB mobile extender, a compact, ruggedized chassis containing a low-power transceiver



and repeater crossover circuitry. When connected to a vehicle mobile radio, RYB allows the mobile to act as a repeater, increasing power and coverage, essentially giving a radio user a high-power mobile radio when using the handheld unit away from the vehicle. The RYB is available in both UHF and VHF versions. ***Circle #180***

E9-1-1 Notification System

Amcom Software announced its E9-1-1 notification system, which helps ensure timely and accurate emergency response to 9-1-1 calls made from within organizations that use PBX phone systems. The system makes sure that dispatch centers receive the caller's automatic number identification (ANI), allowing responders to pinpoint the caller's location. The system simultaneously alerts authorized personnel at the organization where the call originated, allowing them to locate and assist the caller while emergency response is in route. Amcom's system consists of software and hardware components that integrate with PBX systems and corporate databases. ***Circle #181***

Internet and Network Connectivity

San Diego-based broadband satellite infrastructure and services provider **Tachyon** introduced Mobile Network Access, a cost-effective Internet or enterprise network connectivity service for organizations such as public safety or government agencies that need transportable broadband network access. Tachyon's patented signal processing technology offers data rates of up to 2 Mbps. The service, which features a modular

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One-piece die-cast aluminum construction makes this tough, rugged unit able to withstand the most demanding user. Outfitted with a heavy duty mic, fused power cord and mounting bracket kit.

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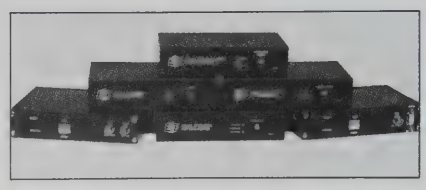
CIRCLE #100

satellite dish and compact carrying cases, costs between $600 and $2,000 per month for T-1 service, depending on the number of days the unit is deployed. ***Circle #182***

NTP Time Servers

ESE introduced four new network time protocol (NTP) time servers that provide accurate and synchronized time throughout a LAN, WAN, or Internet network. ES-104 employs an internal GPS receiver as its time reference, providing the user with a source of Stratum 1 accuracy. ES-289, ES-299, and ES-911/NTP are essentially time code translators, receiving their time reference from external sources of time code. The ES-289 accepts either SMPTE/EBU time code or ESE time code, while the ES-299 references IRIG, NASA 36, XR3, or 2137 time code. ES-911/NTP is designed to accept ASCII time code in NENA, ESE, or NMEA. ***Circle #183***

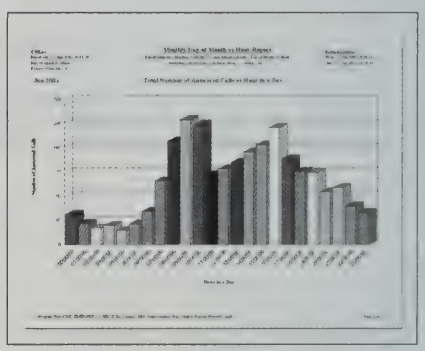


Remote Speaker Microphone

Klein Electronics introduced a remote speaker microphone for iDEN phones used by Nextel, MiKe, and Southern Linc radios. The microphone features an audio port for an optional listen-only earpiece. The product can be used in public safety, security, construction, manufacturing, or maintenance applications that require confidentiality. Made to rugged military specs, the microphone is able to withstand severe weather. ***Circle #184***

E9-1-1 Reporting Tool

CML Emergency Services released Sentinel Stats 2.0, a statistical reporting tool for the E9-1-1 community. In addition to generating call detail reports (CDRs), the software can be used to determine staffing requirements and justify budget requests; track dispatcher performance; analyze response time during peak periods; allocate trunks, lines, or operator positions based on call volume statistics; differentiate between wireless and wireline calls; analyze year-over-trends; and improve general 9-1-1 services. New features in Sentinel Stats 2.0 include user-definable CDRs; seven new statistical reports; graphical reports such as bar graphs and pie chars; enhanced information sharing and archiving; and seamless integration with Sentinel Activity Tracker to display real-time PSAP activities. ***Circle #185***



Ruggedized Handheld Computer

Kontron Mobile Computing announced the newest version of the Field Lite Windows-based handheld computer designed

See Us at APCO CIRCLE #101

See Us at APCO CIRCLE #102

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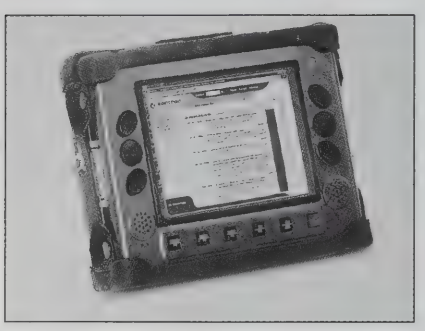
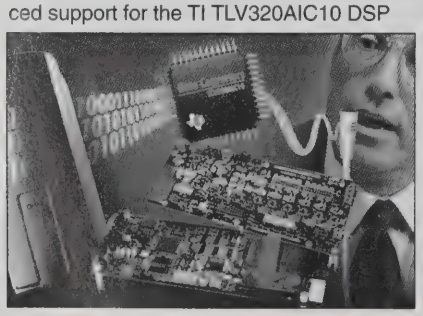
NEW PUBLIC SAFETY PRODUCTS



for field use. Weighing only 5.7 pounds, the Field Lite is a full-feature PC built for applications such as point-and-click data collection, inventory management, and remote wireless communications. With a 6.4-inch, sunlight-readable display, it can be used indoors or outdoors to collect and analyze data in the field without the user having to physically transport the data back to an office or base location. ***Circle #186***

Voice Compression Technology

Digital Voice Systems Inc. (DVSI) announced support for the TI TLV320AIC10 DSP



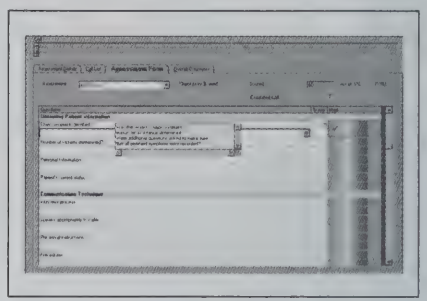
codec for use in conjunction with its AMBE-2000 and AMBE-2020 vocoder chip products. The 16-bit codec provides high-resolution signal conversion from digital to analog and from analog to digital using oversampling sigma-delta technology. The codec provides original equipment manufacturers with a low-cost, high-performance device for the company's second-generation vocoder chip products, which include features such as adjustable data rates from 2.0 to 9.6 kbps, adjustable error correction with Viterbi decoder, and 4-bit soft decision capability. ***Circle #187***

Automatic Vehicle Location System

Integrated Local Government Systems, a division of Siemens Transportation Systems, launched ResponseMaster, a Windows 2000-based situational awareness system that provides comprehensive asset management and mobile data for public safety and emergency services. The vehicle component system provides automated assistance for visual control of incidents and associated resources. It displays incident locations, priority, and vehicle movement of a multiagency fleet during real-time operations, accelerating the availability of field units and dispatch response. Other features include a 12-channel differential global positioning system (DGPS) receiver and an IP-based laptop interface. ***Circle #188***

9-1-1 Quality Assurance Software

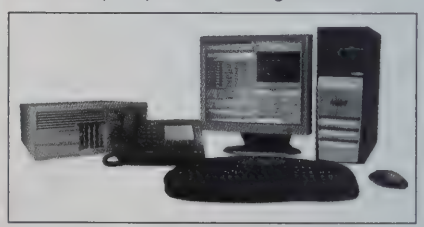
Thales Contact Solutions introduced Dispatcher Assessment 1.0, a software solution that largely automates public safety organizations' quality assurance assessment process. Compatible with Thales' Mirra and Wordnet series



recorders, the software is an online evaluation system designed to let communication center managers objectively assess the quality of telecommunicators' performance and retain the recording as an attachment to the evaluation form for later review. Reports are generated by the software's integrated reporting package and can provide performance, comparison, and trend information for individuals, groups of employees, and supervisors. ***Circle #189***

9-1-1 Platform

VESTA Pallas from **Plant Equipment Inc.** (PEI) is an "office in a box" solution that integrates a 9-1-1 graphical user interface (GUI) with a next-generation



digital private branch exchange (PBX). Pallas integrates KSU/PBX capabilities, VoIP gateway functions, and quality-of-service data routing features in a small, server-size unit that fits easily into small backroom environments. The result is a 9-1-1 and administrative telephone system that is ideal for the small to medium-size PSAP. ***Circle #190***

CIRCLE #104

Join the Industry Leaders at

The Private Wireless Summit 2002

Need to stay on top of the issues, trends, and technologies? Want to network with leaders, peers, and experts? Then register now to attend *The Summit*—the premier annual gathering of North America's private wireless community.

The Private Wireless Summit is co-sponsored by the Industrial Telecommunications Association (ITA), the Council of Independent Communication Suppliers (CICS), and USMSS, a national organization of radio products sales and service firms.

The Summit is coming this fall, to the Nation's capital. It's your single greatest opportunity to review critical issues affecting your interests, examine new products and services, gain essential technology training, and hear and be heard by your government.

The Private Wireless Summit—known in past years as the ***Annual Private Wireless Spectrum Management Conference and Exposition***—is three intensive days of insights and interaction. Whether you're a wireless operator, a dealer, or a service provider, your community and its leaders will be looking for you—at Washington's prestigious Marriott Wardman Park Hotel, **November 6 through 9**.

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CIRCLE #105

Private Wireless Summit Takes Attendees Back to School

By J. Sharpe Smith

There will be no bells ringing to announce the beginning of each session; nonetheless, school *will* be in session at this year's Private Wireless Summit, where the emphasis will be on learning.

"We want this conference to be a place where attendees can come to learn," says Laura Smith, Industrial Telecommunications Association (ITA) president and CEO. "We have the FCC sessions discussing the big-picture policy decisions, but the dealers and end users also need practical information concerning the day-to-day operation of their businesses and communications systems."

The Private Wireless Summit is scheduled for Nov. 6-9, 2002, at the Marriott Wardman Park Hotel in Washington, D.C. Formerly the Private Wireless Spectrum Management Conference and Exposition, the summit is sponsored by the ITA, the Council of Independent Communication Suppliers, and USMSS, the national organization representing Motorola service stations.

Seminars for All

Technology is the lifeblood of our industry and new products provide manufacturers the ability to compete in their market, as well as expand into new areas. Technicians, sales, and marketing staff all need hands-on training with new technologies to make it a reality.

Attendees at the summit will learn about how new products work and how to sell them to existing customers, as well as market them to new industry segments. Companies offering training include Motorola, Kenwood Communications, Tait Electronics, Tessco Technologies, Hutton Communications, and Trident Micro Systems. These sessions will cover a variety of new products and technologies such as wireless Internet applications, AVL, and VoIP.

Attendees will also learn successful business principles and tactics. Topics will include customer service, employee retention, and sales strategies. "This is a good opportunity to teach our attendees how to build their businesses," Smith says. "Effective management techniques are critical for two-way radio dealers in today's competitive environment."

In addition, this year's conference will offer a venue for end users to discuss their communications needs with radio dealers and manufacturers. "Major private wireless users are interested in discussing their needs for big-picture communications solutions that will help maintain their company's productivity and the safety and security of their operations," Smith says. "And, this is the feedback that manufacturers need to hear."

The intimate nature of the Private Wireless Summit provides attendees and exhibitors alike with quality contacts and hands-on learning experiences.

Technician Testing

And what would school be without tests? After a long absence from the industry, technician testing will again be available for the private wireless community at the summit. The certification program will allow companies to certify their technicians through an independent testing organization. These exams are designed to properly reflect the technicians' skill levels.

Tests will be given at a number of levels, from the entry-level Associate Level exam to the Master Level Technician exam, which will reflect technicians' skills in several different areas. These exams provide companies with the means to develop an internal technician advancement program of their own.

Activity on the Exhibit Floor

Outside of the sessions, attendees can continue the learning process in the exhibit booths. The intimate nature of the Private Wireless Summit actually enhances the exhibit floor experience as attendees take part in these technology demonstrations.

"Our exhibitors tell us that the small size of the show actually improves the time that they spend with each customer. Our attendees tend to have pointed questions concerning the products and technology that they are interested in," Smith says. "They get down to the nuts and bolts of how these systems work and whether they are solutions that the attendee needs. The dialogue is helpful for both the exhibitor and the customer." She notes that the available floor space will be double the size of previous annual conferences.

Last but not Least

This year's Private Wireless Summit will feature FCC Commissioner Kathleen Abernathy as the keynote speaker. In addition to her other responsibilities at the FCC, she chairs the Federal-State Joint Board on Universal Service. Prior to her FCC appointment in May 2001, Abernathy was vice president of public policy at BroadBand Office Communications. Before that, she was a partner at the law firm of Wilkinson Barker Knauer.

There's a little bit of education to be had by everyone visiting the Private Wireless Summit. Attendees can expect a multifaceted training opportunity. Radio dealers and end users will benefit from hands-on experience with new products and sessions that discuss new technologies and business development strategies. ■

J. Sharpe Smith is director of industry and public affairs for the Industrial Telecommunications Association.

For more information on the Private Wireless Summit, call (703) 528-5115, e-mail ray@ita-relay.com, or visit www.ita-relay.com on the Web.

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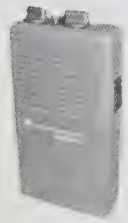

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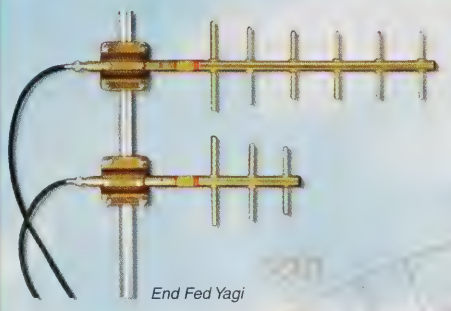

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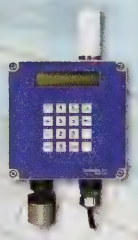

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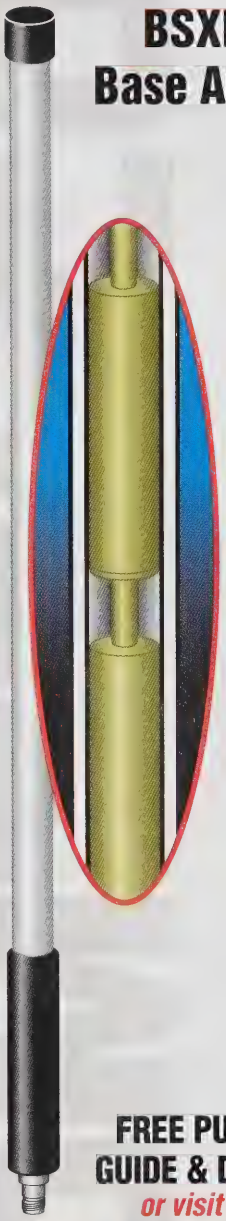

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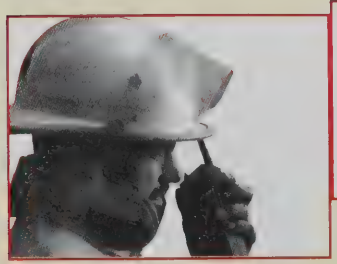

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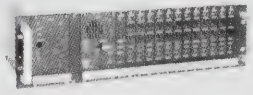

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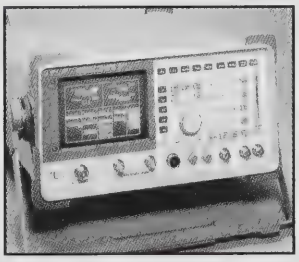

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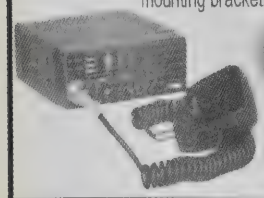

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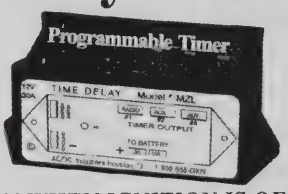

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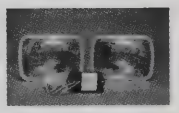

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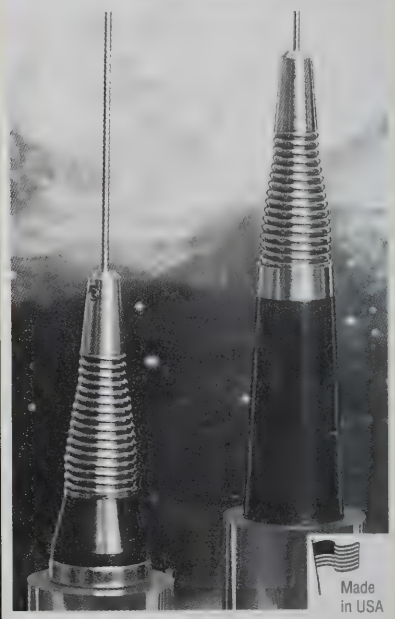

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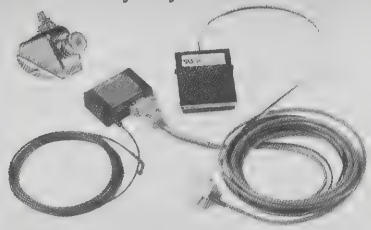

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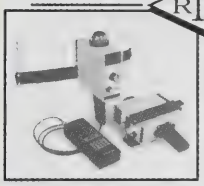

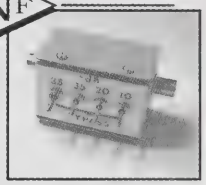

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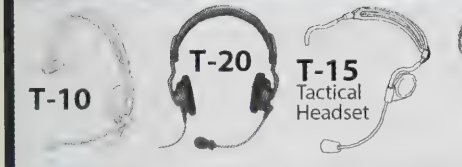

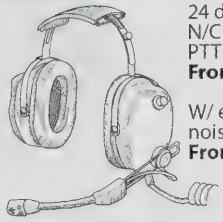

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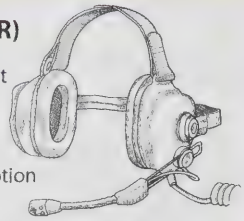

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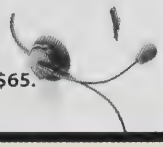

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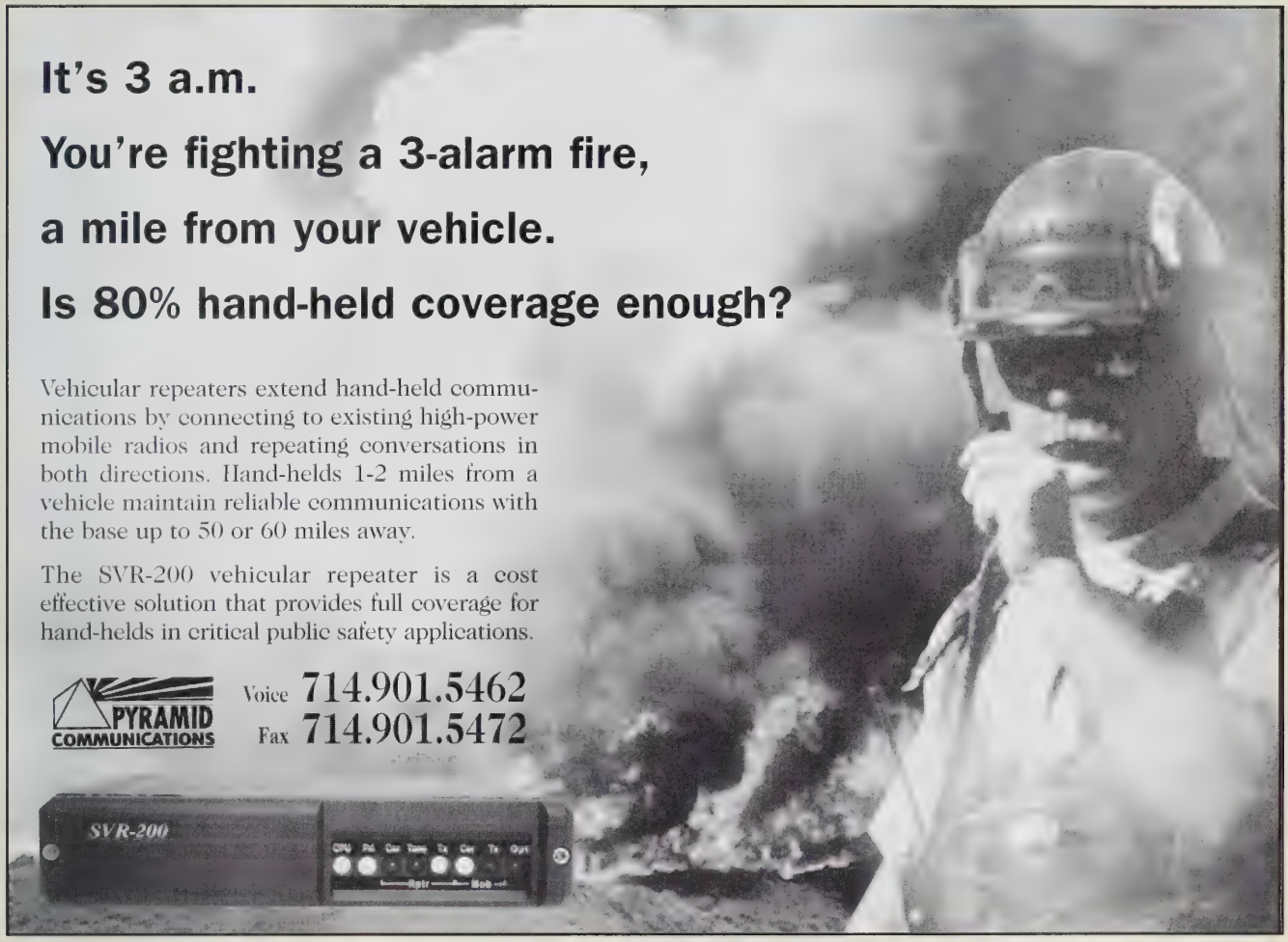

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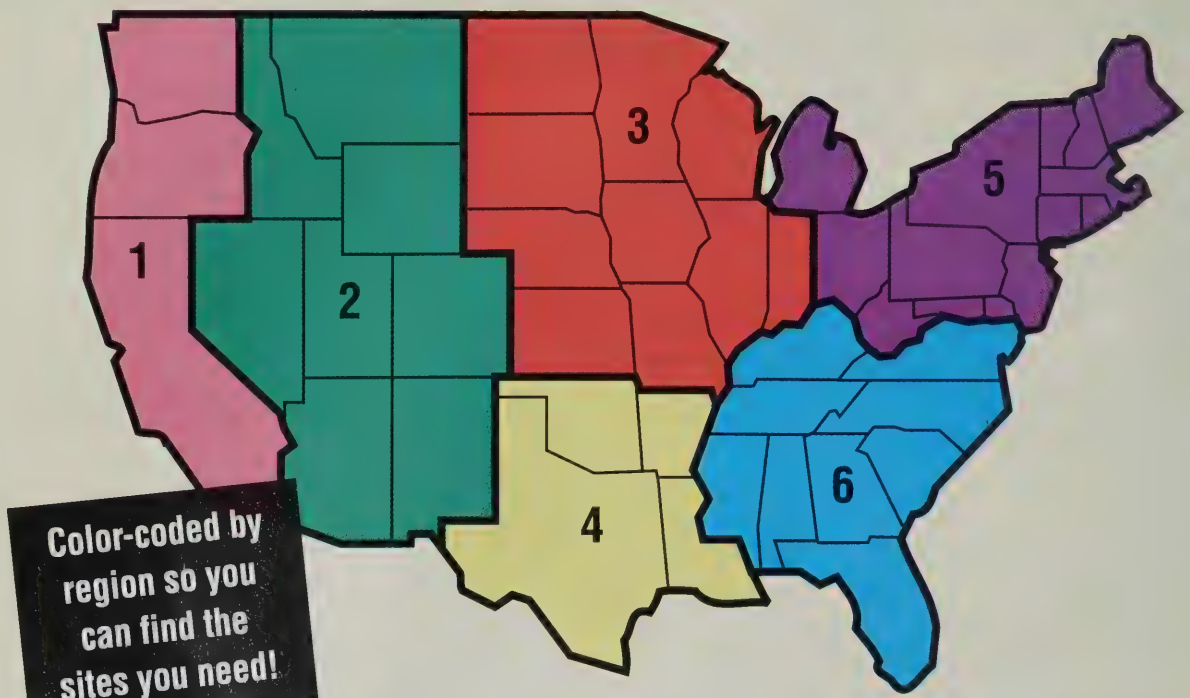

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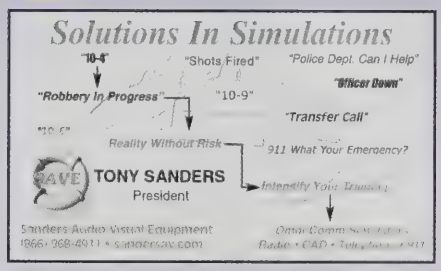

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CALENDAR

September 25-27: MRFAC Fall Meeting, Seattle. Manufacturers Radio Frequency Advisory Committee: Jim Pakla, (800) 262-9206, www.mrfac.com

September 29-October 2: AMRA 2002 International Symposium, San Antonio. Contact (847) 480-9628, www.amra-intl.org

October 1-3: Offshore Communications 2002, Houston. Dan White, (877) 270-7102, www.offshorecoms.com

October 7-9: AMTEX 2002, Fort Lauderdale, Fla. American Mobile Telecommunications Association: Craig Schaar, (202) 835-7819, www.amtausa.org

October 8-9: Location-Based Services Summit, Atlanta. Jeff Pulver, (631) 547-0800, www.pulver.com

October 14-17: World Congress on Intelligent Transportation Systems, Chicago. ITS America: Bob Willis (202) 484-4847, www.itsworldcongress.org

October 16-18: Wireless IT & Internet 2002, Las Vegas. Cellular Telecommunications & Internet Association: Erin McGee, (202) 736-3203, www.ctiashow.com

October 27-30: ATA Management, Orlando, Fla. American Trucking Association: Janis Darrow, (703) 838-1725, www.trucking.org

November 5-6: Communications 2002, Toronto. Canadian Wireless Telecommunications Association: Carrie Moussa, (613) 233-4888 ext. 104, www.cwta.ca

November 6-9: Private Wireless Summit 2002, Washington, D.C. Industrial Telecommunications Association/Council of Independent Communication Suppliers/United States Motorola Service Stations Association: Ray Wisniewski, (703) 528-5115, www.ita-relay.com

November 13-17: Communications Marketing Conference, Ft. Lauderdale, Fla. Communications Marketing Association: Jack Armstrong, (410) 308-0808, www.commktga.com

PUBLIC SAFETY EVENTS

August 11-13: Street Smart and Address Savvy Conference, Portland, Ore. Urban and Regional Information Systems Association: (847) 824-6300, www.urisa.org

August 11-15: APCO 2002, Nashville, Tenn. Contact (888) 272-6911, www.apco911.org

August 20-21: Police & Security Expo Midwest, Rosemont, Ill. Contact (877) 942-4100, www.psemidwest.com/home.htm

August 22-30: Meeting Today's Challenges With Tomorrow's Technology, Arlington, Va. International Municipal Signal Association: (800) 723-4672, www.imsasafety.org

October 1-5: EMS Expo & Outlook, Nashville, Tenn. Contact (818) 786-4367, www.emsmagazine.com

October 5-9: IACP 2002, Minneapolis. International Association of Chiefs of Police: (800) 843-4227, www.theiacp.org

October 12-16: IAEM 2002, Columbus, Ohio. International Association of Emergency Managers: Hazel Reeves, (703) 538-1795, www.iaem.com

October 23-25: PSWN Symposium, Las Vegas. Contact (800) 565-7796, www.pswn.gov

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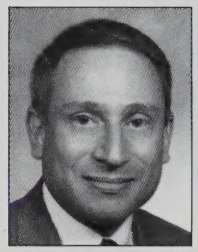
Slicing the Spectrum Pie

By Harold Salters

The Nextel white paper of late 2001 opened the floodgates of creative thinking. In particular, it stoked the debate over how to handle interference to public safety operations on the interleaved channels in the private 800 MHz band that are also home to Nextel's enhanced specialized mobile radio (ESMR) service.



The Nextel white paper and the FCC's subsequent notice of proposed rulemaking in WT Docket No. 02-55 are watershed events for the public safety community. The docket brings into focus vexing questions about not only how to provide adequate and reliable spectrum for public safety, but also how to accomplish that while taking into account the demand for a variety of commercial wireless services — both mobile and fixed. From commercial mobile radio services (cellular/PCS/SMR) to multichannel point-to-multipoint video to fixed wireless, everyone wants a slice of the same high-quality spectrum pie in the bands below 3 GHz.

The debate centers on several key questions. How do you accommodate the public safety community's enhanced responsibilities for homeland security in the wake of Sept. 11? How do you make more spectrum available for commercial wireless operations when some say that wireless should include video in addition to mobile voice and data? And how do you put together a national spectrum policy that answers these questions?

Is There an Answer?

Let me offer some solutions. Fortunately, Congress recently enacted legislation that indefinitely postpones the auction of 30 megahertz of commercial spectrum in the upper portion of the 700 MHz band (channels 60-69). An auction for 18 of the 48 megahertz in the lower portion of the band (channels 52-59) is still scheduled to take place by Sept. 19, 2002, but the remaining 30 megahertz of spectrum loses its statutory auction deadline. This postponement provides some needed thinking and breathing space for the FCC to assess different solutions.

The FCC must stop pretending that all non-public safety spectrum is fungible between video and commercial mobile uses. While virtually everyone agrees that channels 60-69 are prime spectrum for mobile voice/data operations, FCC rules make the spectrum available for *any* mobile, fixed, or video operations. Absurdly, in a band where the power limit is a mere kilowatt, point-to-multipoint video is permitted.

The rules say video is OK, but the technical limits quite appropriately serve to discourage it. I say, "Get over it, FCC." After Sept. 11, it is not only acceptable but also critically necessary to make the value judgments that will get us beyond the Holy Grail of fungibility. With the FCC having recognized that the upper 700 MHz band has good propagation characteristics for the 24 megahertz allocated to public safety, why shouldn't the FCC also simply declare that mobile voice/data in that relatively low-power environment is the way to go for the commercial 30 megahertz portion of that band?

Finding a Solution

On the commercial side, the auction delay displays the willingness of Congress and the Office of Management and Budget to reevaluate their addiction to a steady stream of auction dollars going to the general revenue pool. With the shift in emphasis to homeland security, it is time to let the spectrum auction cash cow off its tether. Commercial mobile radio is an important part of our homeland security effort — whether calling 9-1-1 or providing wireless priority access service to federal, state, and local governments.

Everyone involved should use the additional time provided by the auction delay to consider alternative creative uses of that spectrum and new, more productive uses for auction revenues. For example, the spectrum could serve as a new home for military operations should the 1.7 GHz band be reallocated to commercial third-generation services, with auction dollars funding the relocation of government operations. It could also be used to serve additional public safety operations, joining the existing 24 megahertz of public safety spectrum (channels 63, 64, 68, and 69) as a home for relocated public safety operations from the interleaved private 800 MHz channels. With 3G auction proceeds earmarked for the relocation of the 1.7 GHz band and the possibility of obtaining homeland security funds to facilitate the public safety transition, these ideas merit exploration.

Here's another idea: End the broadcasters' stranglehold on spectrum. Congress must remove the 85 percent digital penetration standard (we are now at around 2 percent) and mandate that broadcasters vacate the spectrum by 2006. Politically unpopular, I know, but it is what should be done. Removing this sacred cow is critical for both public safety and commercial mobile operations since channel 60-69 TV operations hem-in and constrain the scope of both public safety and commercial mobile operations.

As we recognize the needs of homeland security and our first responders, the time has come to remove the broadcasters' trump card. A bill introduced in the House of Representatives, the Homeland Emergency Response Operations (HERO) Act (HR 3397), would do just that by prohibiting any TV extensions beyond December 31, 2006. ■

Harold Salters is director of federal regulatory affairs for VoiceStream Wireless. The views expressed are solely those of the author and do not necessarily reflect VoiceStream policy. He may be contacted at harold.salters@voicestream.com.

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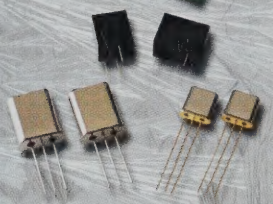

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